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# **Spaceport & Technology Committee**

**Tuesday, January 10, 2006**

**1:15 PM to 3:15 PM**

**Room 12, HOB**

**MEETING PACKET**



# **The Florida House of Representatives**

**State Infrastructure Council**

**Spaceport & Technology Committee**

**Allan G. Bense**  
Speaker

**Bob Allen**  
Chair

## **AGENDA**

### **COMMITTEE ON SPACEPORT & TECHNOLOGY**

**January 10, 2006**

- 1. CALL TO ORDER BY CHAIR**
- 2. GENERAL OPENING COMMENTS BY THE CHAIR**

**Welcome and Opening Comments by the Chair.**

### **3. AGENDA ITEMS**

Presentations and workshop issues related to education and research and development opportunities in the Space Industry.

Tab

- (1) Jim Banke, Space Foundation, VP Florida Operations  
Space Foundation  
Report on November 2005 Space Conference and findings regarding the future of space.



**Education and R&D Opportunities for the furtherance of Space Industries.**

- (2) Dr. Rodney Piercy, Dean, College of Arts and Sciences  
Embry Riddle Aeronautical University  
Space education and research capabilities; Beowolf Computer Cluster.
- (3) Dr. Benjamin Goldberg Director, Engineering and Advanced Programs.  
Pratt & Whitney  
Education Outreach Program for 4<sup>th</sup> and 5<sup>th</sup> graders.
- (4) NASA – unable to present; materials will be provided for our packages Education and Outreach Programs
  - Teacher Education
  - Explorer Schools
  - Other
- (5) Dr. Ron Phillips  
Florida Space Institute  
Program summary and update on research activities.
- (6) Ms. Penny Haskins, Associate Director  
Florida Space Grant Consortium  
Status on research activities and education programs.
- (7) Mr. Winston E. Scott, Executive Director  
Florida Space Authority  
Status on education programs.
- (8) Mr. Tommy Bowermeister  
Office of Studies and Analysis  
Florida State University  
Brief summary of 2004 Report to the SAFE Council; findings and recommendations (the report compiles all aerospace/aeronautics/aviation programs in Florida schools; makes recommendations to improve student involvement and

performance in math & science, linkages to higher education, linkages to workplace readiness skills, teaching the teacher programs).

4. Committee members identify issues for future review and consideration.
5. Committee discusses future committee meetings; Chairman takes questions
6. Closing remarks by Chair.

Presentation to the  
**Florida House Spaceport and Technology Committee  
of the State Infrastructure Council**

By Jim Banke  
Vice President of Florida Operations for the Space Foundation  
January 10, 2006

Good afternoon. My name is Jim Banke and I am Vice President of Florida Operations for the Space Foundation. The Space Foundation is the nation's leading non-profit space advocacy group and is based in Colorado Springs.

From our office in Port Canaveral, my job is to assist the aerospace industry, NASA, the Air Force and the community at large in any way I can so that our state and our nation can enjoy the benefits of a robust space program and a dynamic space economy.

One way I am doing this is by serving on Governor Bush's Commission on the Future of Space and Aeronautics in Florida. And as a commissioner, I can assure you that this committee will soon have a very interesting report to read and recommendations to consider.

Another way the Space Foundation is working in Florida is to respond to the needs of those whom we consider our customers, and in the case of the Florida Space 2005 conference held last November, we were responding to a request from NASA's Kennedy Space Center, the Air Force's 45<sup>th</sup> Space Wing and the Florida Space Authority.

It's that conference that Chairman Allen has asked me to tell you more about today. And I am very thankful to you, Mr. Chairman, for this opportunity to share some of the discussions and highlights from Florida Space 2005. I'm sure this committee will find some of the things I say very relevant.

First, some quick history. Florida Space 2005, which was held Nov. 15 to 17 at the Kennedy Space Center Visitor Complex, combined and replaced two long-standing events held in Brevard County, namely the Cape Canaveral Spaceport Symposium and the Space Congress.

The Spaceport Symposium was mostly the product of the Air Force and the Florida Space Authority, tended to concentrate on matters involving the Eastern Range, and began about 11 years ago – although it did not convene every year.

The Space Congress was a spring staple in Cocoa Beach, going back some 42 years. Primarily a technical conference, it was managed by the Canaveral Council of Technical Societies with cooperation from NASA, the Air Force, the State and industry.

Following the 2004 Space Congress and Symposium, our “Big Three” space leaders of Jim Kennedy, Winston Scott and Brig Gen Greg Pavlovich got together and decided that with major changes facing the Space Coast and the entire State because of things like the Vision for Space Exploration and the emergence of space tourism, the previously held technical events needed to be replaced by something more aligned with their needs.

They approached the Space Foundation, which has an internationally acclaimed track record for putting on world-class events, and in between all the hurricanes that year Florida Space 2005 was born.

Flash forward to November of last year. By all accounts and feedback, our first Florida Space conference was a resounding success. We had 267 paid registrants, a total of 349 attendees for the program and more than 600 Opening Ceremony attendees.

Our outdoor Opening Ceremony was particularly memorable, with a grand display of fireworks sponsored by United Space Alliance over the Visitor Complex’s Rocket Garden. And when you looked up, also in the sky over the Kennedy Space Center was a full Moon and the planet Mars shining as a brilliant red star. It was an incredibly moving sight.

During the next two days we hosted many outstanding speakers, highlighted by our own Lt Gov Toni Jennings. Also on hand were Gen Lance Lord, Commander of Air Force Space Command; NASA Administrator Dr. Mike Griffin; and The Honorable Ronald Sega, Undersecretary of the Air Force.

Chairman Allen also spoke, leading off the second day of the program with a “Make Florida First in Space” message that was widely hailed by the attendees as one of the best speeches of the conference.

In addition to these speakers, the compelling program featured other federal, state and local officials, in and out of the space business, as well as professional space journalists, retired military leaders and financial market leaders.

Content focused on the many issues facing Florida during this radical transformation of the global space industry. Many speakers discussed the current business opportunities and those that lay ahead as the Vision for Space Exploration becomes a reality.

Speakers also addressed the endless possibilities that extended beyond the launch sector, including new spacecraft manufacturing, basic and applied research opportunities, software development, space tourism, national security space and a plethora of next-generation space activities.

Florida Space 2005 concluded on the 17<sup>th</sup> with a dinner at the Apollo Saturn V Center and a presentation by the National Space Club Florida Committee of the first Florida National Defense Space Award. The annual honor is given to someone stationed in Florida who has made a significant contribution to our national security using space assets.

For the record, the first recipient was Capt Kirk Riggs of the 16th Special Operations Wing, Air Force Special Operations Command, at Hurlburt Field on the Emerald Coast. Let me tell you that his words of thanks didn't leave a dry eye in the place.

Now that a few weeks have passed and we've had a chance to reflect on lessons learned and what we heard, I'd like to highlight a few points that may be valuable for you to hear. And if this isn't new to you, then I hope you will appreciate being reminded of these observations.

First, Florida must be seen as more than a launch site. We are willing and able to handle research and manufacturing as well, all supported with a strong foundation built on a solid education system capable of turning out a trained workforce, as well as the economic incentives to pay the way.

Next, within the state of Florida, business and community leaders need to see the space program as benefiting the entire state, not just Brevard County. There is ample economic data to support this claim. There are companies contributing to space efforts in virtually every county in the state. When this recognition happens we will be in a better position to compete with other states.

Third, space tourism is not a fad or a myth. It's real and the state must move quickly or lose this market completely. And since the conference concluded we've seen one company go to New Mexico and another that is already here wondering if it should move.

Another, the Vision for Space Exploration is extremely great for the nation, but will cause the Kennedy Space Center area some short-term challenges as the Shuttle is retired and replaced by a system that needs fewer people to operate. Overcoming this economic threat will require innovative partnering by industry and government. At the same time, the state needs to do more to support the Vision at the national level as it arguably has the most to lose if the Vision is not fully implemented.

Finally, Florida must speak as one voice in regards to its future in space. The various organizations that exist now often appear to be competing more than complimenting each other. That sends the wrong signals to industry and hurts our chances to grow. Related to this, it would be helpful if the office of the Governor and the Florida State Legislature would take a more active and visible role in supporting the space program and space industry in Florida.

As was seen with Governor Richardson's recent leadership in announcing the creation of the New Mexico spaceport, other states are recognizing the importance of space at the very highest levels of government.

The Space Foundation believes that vibrant space development efforts by space states help promote a stronger U.S. space economy nationwide. A more visible effort to promote Florida would benefit the state and the nation.

In closing, I would say that based on what was seen and heard at the conference, there is a strong sense that Florida takes its leadership in space for granted. The perception is that the federal money will always flow and the Cape will always be America's launch site so the State doesn't have to worry too much about anything.

Well nothing could be farther from the truth. In 2005, Russian launch operations accounted for more than half of all launches in the world, and European launch operations continued to win the lion's share of the commercial launch market.

It's time for everyone outside of Brevard County to pay attention and become part of a solution that makes the Sunshine State the unrivaled leader in not only in space launch, but space manufacturing, space tourism, space operations, space research, and space education.

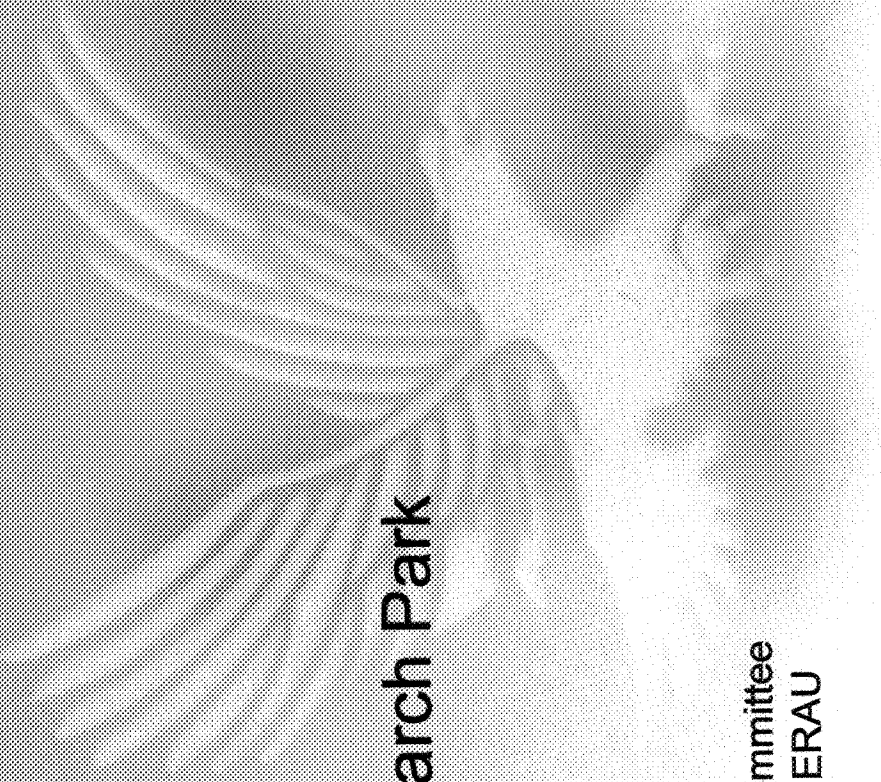
Thank you for your attention. Mr. Chairman, I would be happy to answer any questions you might have.



# **EMBRY-RIDDLE**

## **AERONAUTICAL UNIVERSITY**

- University Overview
- Academic Programs
- Research Programs
- Aviation Aerospace Research Park



Presented to the Florida House Space & Technology Committee  
Rodney B. Piercey, Dean College of Arts and Sciences, ERAU  
January 10, 2006

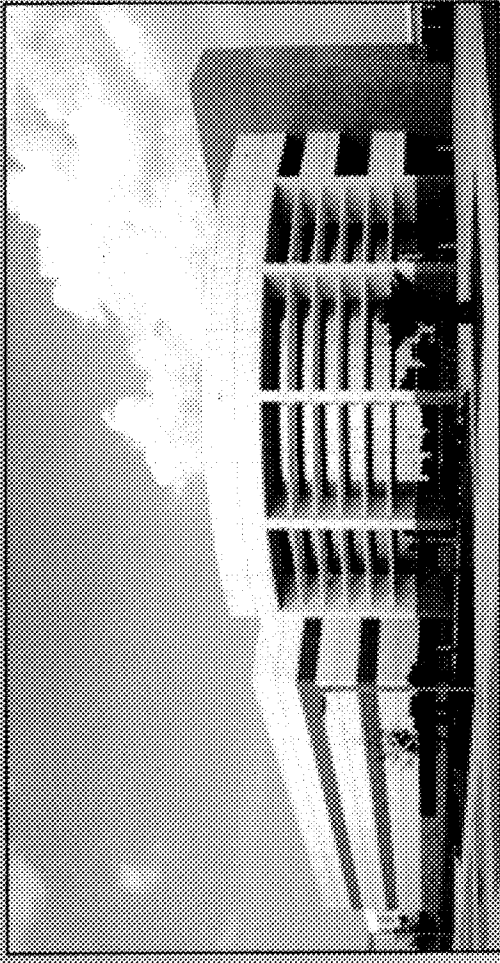
# About Us

- Founded on December 17, 1925 by John Paul Riddle & T. Higbee Embry
- 2 residential campuses in Florida and Arizona and more than 130 Extended Campus locations worldwide
- Fully accredited undergraduate and graduate degree programs
- A fleet of 93 aircraft & 41 state-of-the-art simulators
- Combined annual enrollment exceeds 30,000 students and represents 97 countries
- 436 full-time and more than 3,000 part-time faculty
- 125,000 flight training hours annually



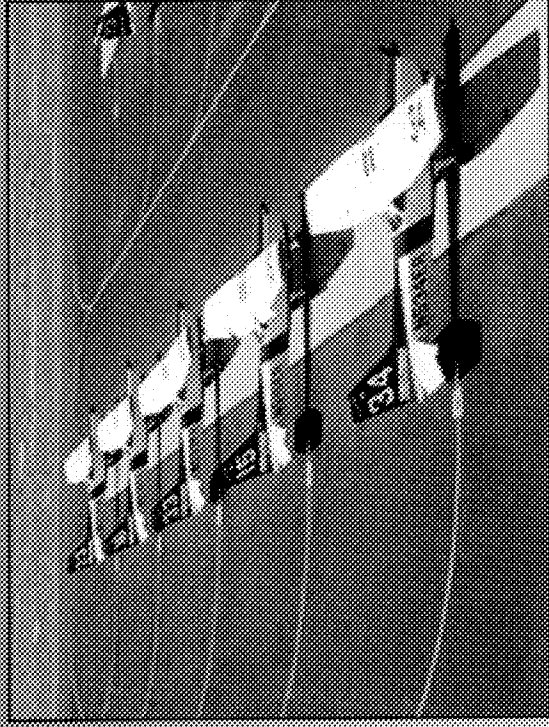
# Daytona Beach Campus

- 185-acre campus
- 4,800 full-time students

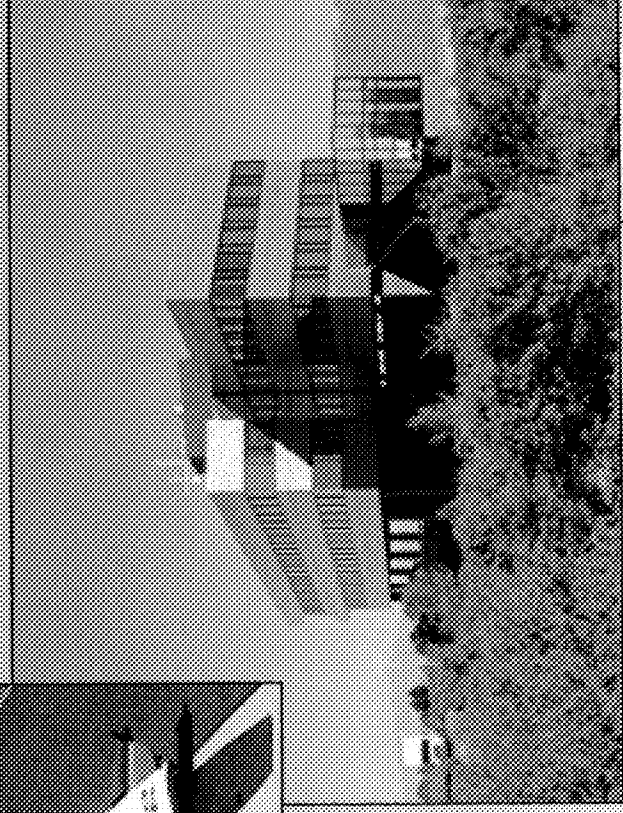


- 34 Undergraduate and Graduate degree programs
- Developing Business and Research Park

# Prescott, AZ Campus



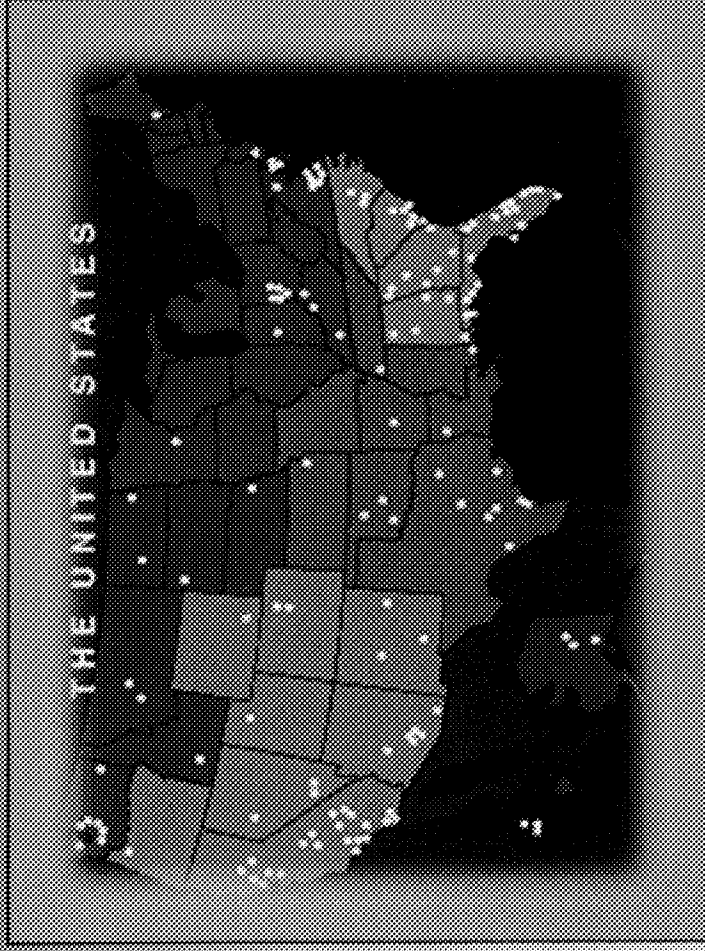
- 565-acre campus
- 1,800 full-time students



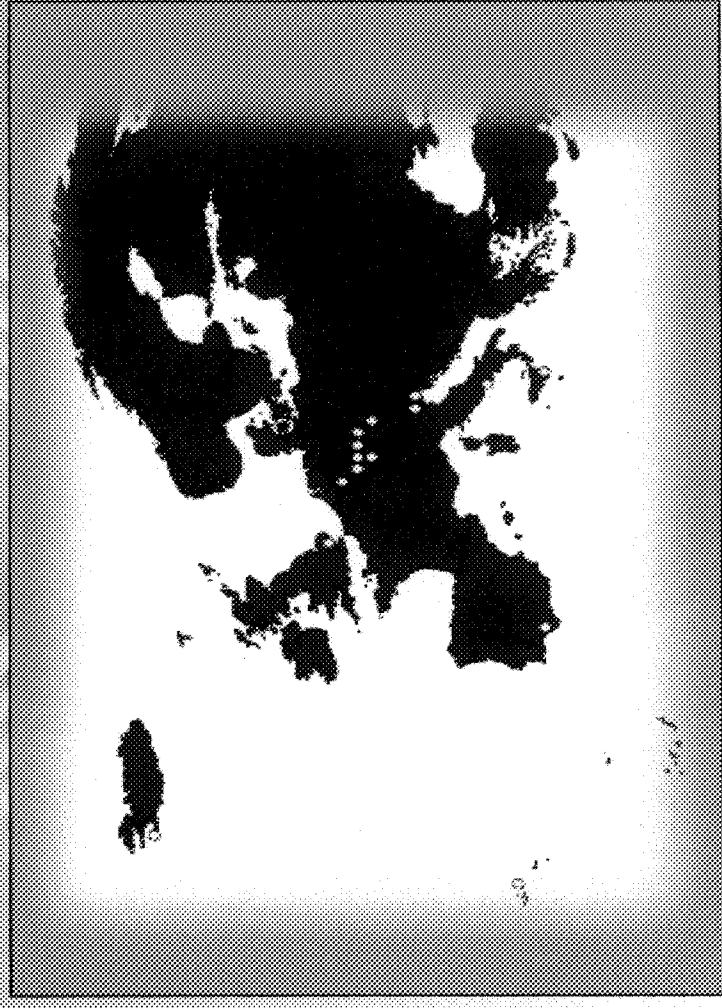
- 30 Undergraduate and Graduate degree programs
- Developing Business Park



# Extended Campus



- 132 Centers World-wide
- Interactive distance learning throughout the world covering every continent



- 7 Undergraduate and Graduate degree programs
- 25,000+ students
  - (US, Europe & Distance Learning)

# A Bold Vision

To shape the agenda for aviation and aerospace by leading in the education of its professionals, and by pioneering new knowledge through research and discovery.



# Areas of Academic Emphasis

- **Aeronautical Science**
- **Air Traffic Management**
- **Applied Meteorology**
- **Aerospace Engineering**
- **Human Factors**
- **Engineering Physics**
- **Airline/Airport Management**





# Academic Emphasis

- Nation's largest aeronautical science degree program
  - The Aeronautical Science (professional pilot) program graduates about 400 each year – about 1 out of 3 nationally.
  - The major airlines hire more alumni from Embry-Riddle than from any other collegiate aviation program. About 1 out of 4 airline pilots in the US are ERAU graduates.
- Nation's only FAR Part 142 flight program
  - Under Part 142, the flight program, uses simulators for 32% of flight training. Other university programs use simulators about 12%.
- Nation's largest air traffic management degree program
  - The air traffic management degree program enrolls about 600 students in its major and minor.
  - ERAU is the largest supplier of degreed Air Traffic Controllers to the FAA.

# Academic Emphasis

- Nation's largest aerospace engineering program
  - The AE program graduates about 210 students annually - about 1 out of 3 nationally
  - The AE program is ranked by US News and World Report as the #1 program in the US among non-Ph.D.- granting institutions (five years in a row).
- Nation's largest ABET accredited engineering physics program
  - The only EP program that focuses exclusively on space exploration and space systems engineering.



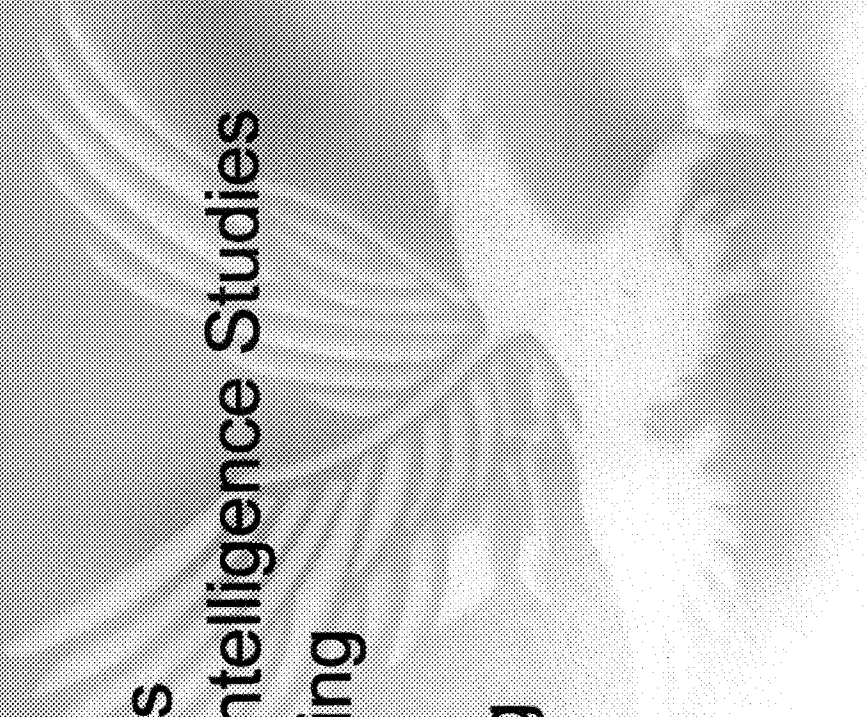
# Career Emphasis

- Within one year of graduation from the residential campuses, 94% of Embry-Riddle graduates are either employed or have decided to continue their education
- A growing number of graduates are choosing to continue their education
- Most graduates work in their industry of choice or in a closely related industry
- Six alumni are current or former astronauts



# New Academic Programs Developed Over the Past Three Years

- M.S. in Safety Science
- M.S. in Space Science
- B.S. in Aerospace Electronics
- B.S. in Global Security and Intelligence Studies
- B.S. in Mechanical Engineering
- B.S. in Space Physics
- B.S. in Electrical Engineering
- B.S. in Homeland Security



# New Programs Under Consideration

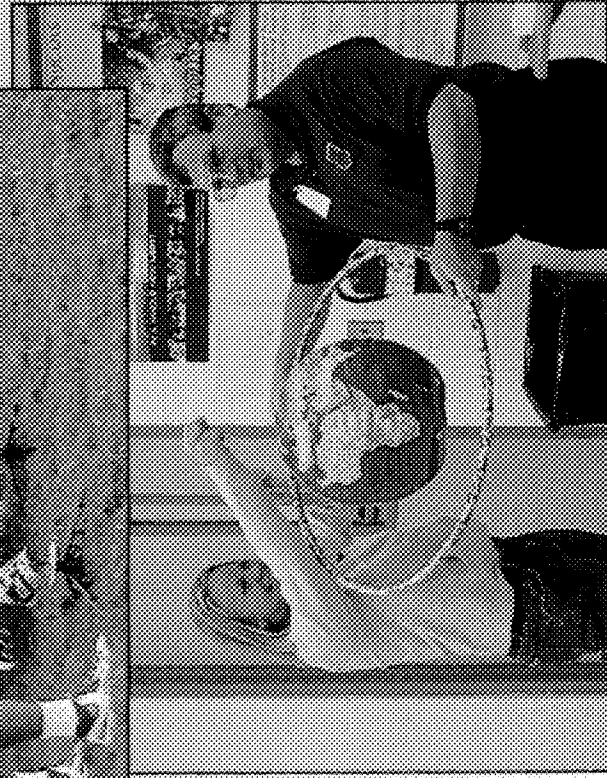
- B.S. Accounting and Finance
- B.S. Entrepreneurship
- B.S. Logistics Management
- B.S. Management Information Systems
- B.S. Transportation Systems Management
- B.S. International Business
- B.S. Astronomy
- B.S. Bioastronautics
- B.S. Chemistry
- B.S. in Aviation Environmental Sciences
- B.S. Systems Engineering
- B.S. Foreign Languages (Arabic and Chinese)
- M.S. Applied Meteorology
- M.S. Project Management
- M.S. Systems Engineering
- M.S. Global Security and Intelligence
- Ph.D. in Aeronautics
- Ph.D. in Aerospace Engineering
- Ph.D. in Engineering Physics



# **Public Outreach and Consortium Activities**

- Space Education Consortium
- Oskaloosa Aerospace Academy
- Florida Space Grant Consortium
- National TeachSpace Program
- Florida Space Research Institute
- Florida Space Authority
- Florida Space Institute
- Florida Launch Program

# NASA-sponsored, TeachSpace Workshops for K-12 Teachers



# TeachSpace



# ERAU Research

- More than 120 active applied research projects underway for industry and government with expenditures approximately \$10,000,000/yr

- Aircraft Performance & Technology
- Airport Operations & Safety
- Space Systems Engineering and Mission Design
- Atmospheres, Space Weather, Meteorology
- Aviation Safety & Security
- Flight Performance & Training
- Air Traffic Management
- Safety-Critical Real-Time Software
- Autonomous Machines
- Human Factors
- Aviation and Aerospace Business



## **Aerospace Related Sponsors for New Awards in FY 2004-2005**

<b>Sponsor</b>	<b>Total Awarded</b>
<b>FAA</b>	<b>\$1,978,922</b>
<b>NSF</b>	<b>\$1,469,063</b>
<b>Okaloosa</b>	<b>\$1,160,990</b>
<b>NASA</b>	<b>\$488,619</b>
<b>Boeing</b>	<b>\$391,733</b>
<b>NCAM</b>	<b>\$276,500</b>
<b>ENSCO</b>	<b>\$113,644</b>
<b>U. Central Florida</b>	<b>\$95,000</b>
<b>American Airlines</b>	<b>\$42,093</b>
<b>US DOE</b>	<b>\$30,000</b>
<b>U. Colorado</b>	<b>\$22,628</b>
<b>F-DOEd</b>	<b>\$16,046</b>
<b>Gulfstream</b>	<b>\$10,682</b>
<b>Fl. Space Grant</b>	<b>\$6,600</b>



# Centers of Excellence

- FAA General Aviation Center of Excellence

*"Bring together and unleash the best minds in the country to assure that the U.S. air transportation system remains the safest, most secure and efficient in the world."*\*

- ERAU leads the consortium with members University of North Dakota, Wichita State University, University of Alaska, and Florida A&M University.

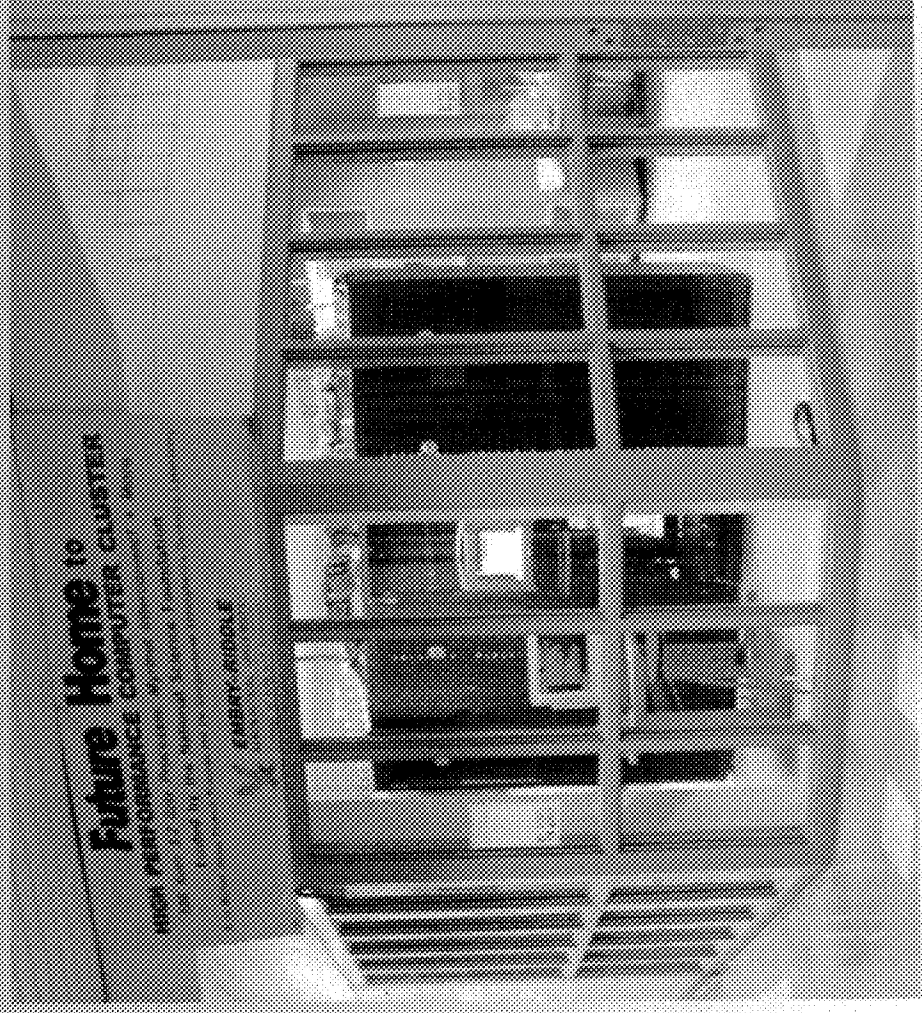
- ERAU Centers:

- Center for Applied Engineering and Research (Eagle Works)
  - Center for Integrated Transportation Safety and Security (CITSS)
  - Center for Aviation Safety/Security Education (CASE)
  - Center for Applied Air Traffic Management Research (CAAR)
  - Center for ATC Simulation and Modeling
  - Airline Operations Simulation Laboratory (AOSL)
  - Laboratory for Advanced Instrumentation Research (LAIR)

*\*from FAA website*

# Embry-Riddle Aeronautical University's High Performance Computer Cluster (Beowulf)

- Funded by the National Science Foundation
- Partner Bethune-Cookman College
- Supplied by Dell
- To support all computational research, research training, and education related to that research at ERAU and BCC

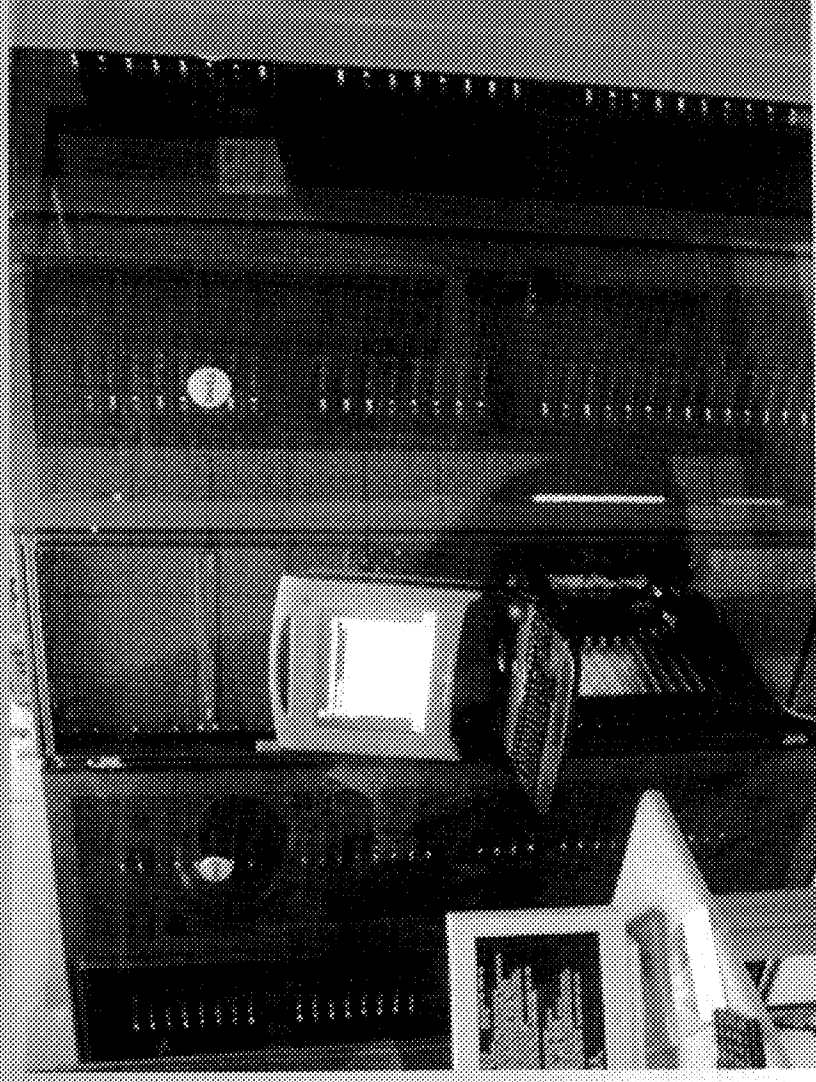


*The Beowulf in ERAU's Lehman Building.*



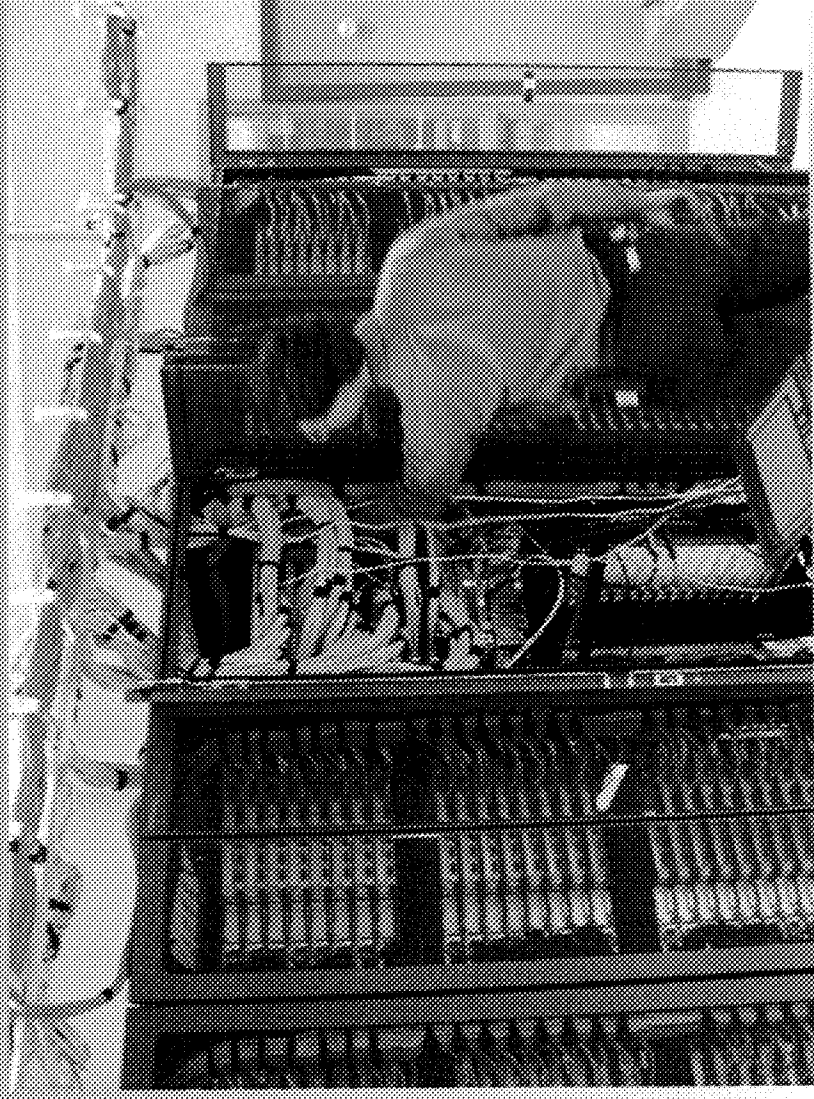
# ERAU Beowulf

- 131 dual-processor nodes (3 head, 128 compute)
- 262 processors
- 3.2 GHz Intel Xeon (64-bit)
- Minimum RAM 4 GB per node
- Myrinet Interconnect
- Hard Drives: 73 GB (3+16), 36 GB (1+2)---all mirrored
- Redhat Linux OS
- Internet-2 link to BCC and Prescott, AZ



# ERAU Beowulf

- ERAU encourages collaboration with others to use the Beowulf
- The Beowulf will help advance research and education in the state of Florida
- The Beowulf is rated at 3.3 TFlops
- It is in the top 12 fastest Rocks clusters in the nation and is the fastest in Florida.
- The Beowulf comes online in late January 2006.





# Significant Events in 2004-2005

- Received 2 NSF Career Awards in physical sciences
- Beowulf Supercomputer installed and ready to start (one of the most powerful computer clusters in FL)
- Successful SATS demo in Sebring, Tallahassee, and with NASA in Danville, Va.
- Eagleworks moved to new hangar
- CAAR and AOSL partnership formed
- Beginning of UAV group and conference

# ERAU Research Park Concept in Dayton Beach

A center of economic and technology development for industries related to aerospace and aviation

## Purpose & Benefits

- Partner with OEMs, Industry & Research Labs
- Create / Enhance Aviation Centers of Excellence
- Commercialize New Technologies
- Technology Transfer
- Economic & Business Development Engine
- Attract jobs with wages well above county average





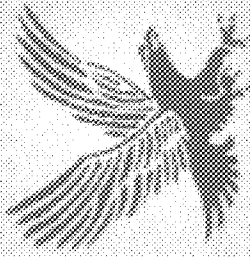
# ERAU Research Park

- Daytona Beach, 140 acres:
  - Partnership with the City of Daytona Beach, Volusia County, and Daytona Beach International Airport
- Applied research and product development
- Leverage ERAU's externally funded research projects
- Airside hangar access and flight test capabilities
- Attract industry research partners to the area

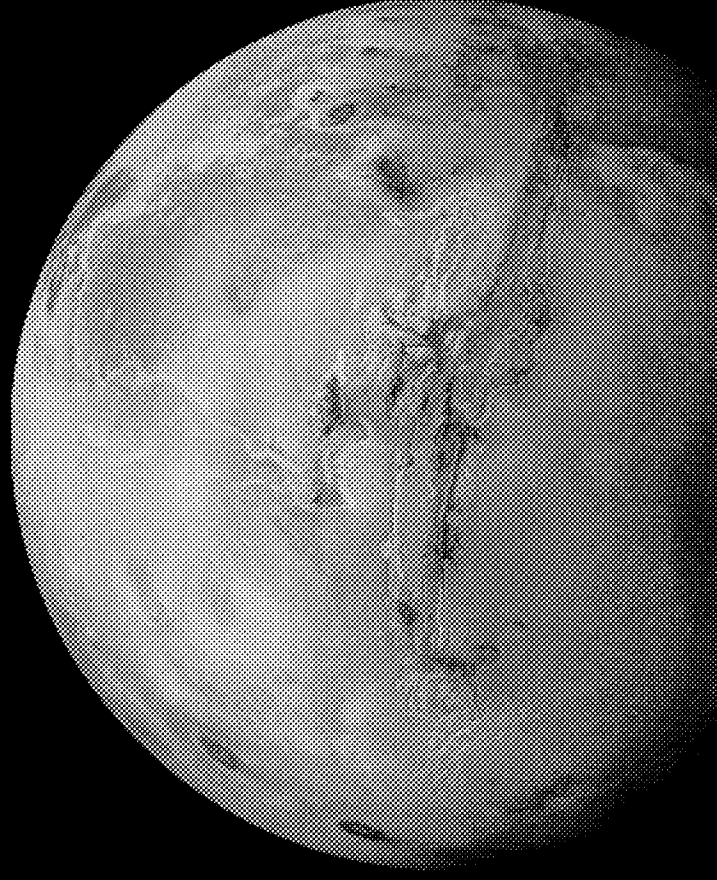


# A sampling of our Education & Research Partners

- Airbus Industries
- Aircraft Owners & Pilots Association
- American Airlines
- BAE Systems
- BF Goodrich Avionics
- Boeing Company
- Bombardier Aerospace, Inc.
- Cessna Aircraft Company
- Continental Airlines, Inc
- Delta Air Lines
- EADS
- Eclipse Aviation Corp
- Embraer
- Federal Aviation Administration
- FedEx
- General Electric Aircraft Engines
- Honeywell, Inc.
- International Civil Aviation Organization
- Korean Airlines
- Lockheed Martin
- NASA
- Northrop Grumman Corporation
- Northwest Airlines
- NTSB
- Phoenix Sky Harbor Airport
- Piper Aircraft Corporation
- Raytheon
- Rockwell Collins
- Rolls Royce Corporation
- Smiths Aerospace
- Southwest Airlines
- The MITRE Corporation
- United Airlines
- UPS
- United States Aviation Underwriters
- Women In Aviation

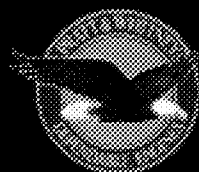
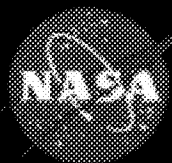


**EMBRY-RIDDLE**  
AERONAUTICAL UNIVERSITY



...Leading the World in  
Aviation and Aerospace Education...





Supplement to Weekly Reader  
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Mission 3 • April 2006

# ***Taking Up Space***

## **Inside This Issue:**

Florida - America's  
Space Center

Kids Question  
the Cosmos

Games

Next Mission:  
July 2006

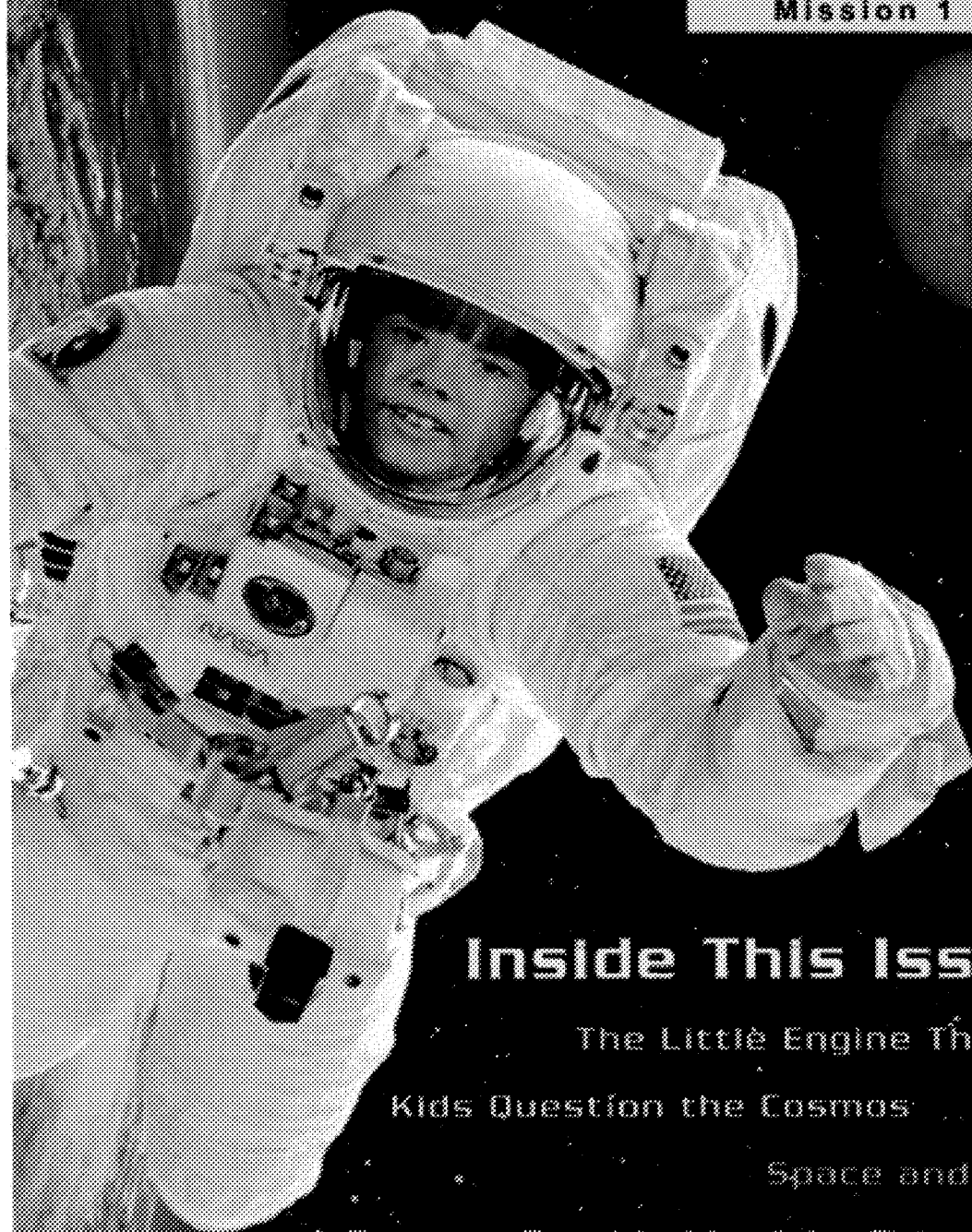
explore more at [TakingUpSpace.net](http://TakingUpSpace.net)



A Weekly Reader Supplement  
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# Taking Up Space

Mission 1 • October 2005



## Inside This Issue:

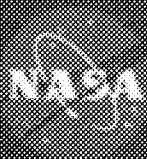
The Little Engine That Does  
Kids Question the Cosmos

Space and Time

Games - Provided by "the Scientist"

Next Mission: January 2006

explore more at [takingupspace.net](http://takingupspace.net)



Supplement to Weekly Reader  
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# Taking Up Space

Mission 2 • January 2006

## Inside This Issue:

Recycling Our Way  
to the Moon

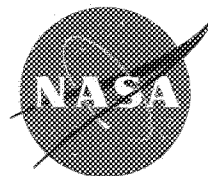
Kids Question  
the Cosmos

Amazing  
Shuttle Facts  
Games

Next Mission:  
April 2006

explore more at [TakingUpSpace.net](http://TakingUpSpace.net)





# KSC Summer Education Program

*This summer KSC was the place to be for education programs. The Center was the host for 141 students and educators participating in 14 different programs. Through these programs, both NASA team members and participants observed each other and learned how the agency benefits by allowing these opportunities. Highlights from some programs are listed below.*

## Student Programs K-12

**NASA Explorer Schools (NES)** - The NES program focuses on fourth through ninth grade educators and students. This summer twenty students and teachers from three different NES were invited to the STS-114 launch. All were excited and enjoyed sitting near first lady Laura Bush.

**Science Fair Intern** - A summer internship Award is presented to a graduating Florida high school senior based on an outstanding project directly related to NASA's overall missions, programs, and activities, and a personal interview. The award recipient works full time for eight weeks during the summer at KSC, gaining valuable experience while earning an income. KSC employees support 34 elementary school science fairs in Brevard, Orange and Volusia Counties; three Brevard regional middle and high schools and two state competitions.

**Summer High School Apprenticeship Research Program (SHARP)** - Twenty-two high school students were selected to participate in the Commuter Component of the NASA (SHARP) for eight weeks, June 6-July 29, 2005. NASA SHARP is designed for students who have demonstrated a strong interest in and aptitude for science, technology, engineering, and mathematics (STEM).

**For the Inspiration and Recognition of Science and Technology (FIRST)** - In support of NASA's Mission to inspire the next generation of explorers, KSC once

again partnered with the University of Central Florida to host the 2005 Florida FIRST Robotics Competition. FIRST inspires in young people, their schools and communities, an appreciation of science and technology, and how mastering these can enrich the lives of all. External studies have been conducted of the FIRST robotics program and perhaps the most striking finding is the high proportion of FIRST alumni who have decided to major in engineering.

## Undergraduate

**Spaceflight and Life Sciences Training Program (SLSTP)** - Thirty students from the U.S. and Canada had an opportunity to participate in projects in three areas of emphasis: environmental systems, closed biological systems and flight experiments. These projects highlighted the unique features of research conducted in space and the challenges associated with planning and conducting long duration space flight missions and experiments. The main purpose of SLSTP is to attract and train college students interested in research relevant to the NASA mission-related field of space flight and life sciences.

**Increasing Minority Access to Graduate Engineering (IMAGE)** - Three students from Florida A&M University participated in this program. IMAGE is a scholarship program made possible with a grant from NASA Headquarters. Financial and academic support is provided for participants through their undergraduate years of study, and upon graduation, they are offered assistance in pursuing graduate study and employment.



**Undergraduate Student Research Program (USRP)** - KSC was home to eight interns participating in this program. Chosen from over 500 undergraduate student applications representing more than 300 colleges and universities from all 50 states and Puerto Rico, the students, who were fully representative of America's rich diversity, worked with technical mentors in their chosen discipline during the summer for ten weeks.

**University of New Mexico-NASA Training Project (UNM-NTP)** - Two students from the University of New Mexico participated in this ten week program. The UNM-NTP mission is to increase the awareness, interest, and training of underrepresented groups in mathematics, physics, engineering, and education.

**Achieving Competence in Computing, Engineering and Space Science (ACCESS)** - Three students participated in this ten week program. ACCESS is designed for undergraduate and graduate students with disabilities who have strong backgrounds in science and a desire to pursue technical careers. Students worked with scientists and engineers in an area compatible with their skills and interests. Participants had an opportunity to apply academic skills in the workplace and obtain practical professional experience.

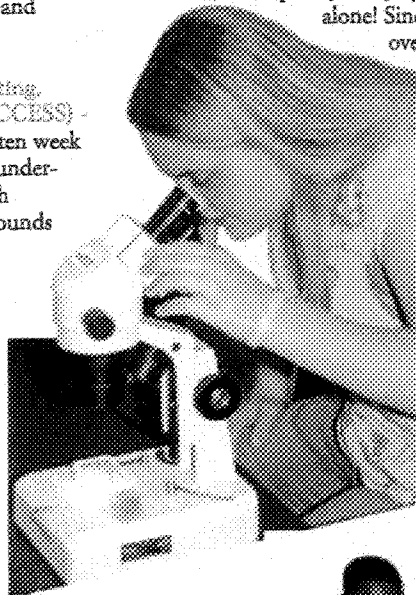
**Strategic Preparedness Advancing Careers in Engineering/Sciences Program (SPACE)** - One student from Morehouse College was selected to participate in this ten week program. SPACE is a scholarship program made possible with a grant from NASA. Students selected for the program are named Ronald E. McNair Scholars in honor of the late Challenger astronaut. McNair Scholars are required to maintain a minimum grade point average of 3.0 and enroll as a full-time student each semester/quarter. The scholarship is renewable each academic year for a period of five years.

## Education Workshops

**Educator Resource Center (ERC)** and **Exploration Station (ES)** - Located right here at the Visitor's Complex, 1856 teachers participated in face-to-face educator workshops in June, July and August

alone! Since October 2004 over 27,000

teachers and students were reached by the ERC and ES. Nearly 15,000 individuals from the general public participated in the ES programs, for a total of over 42,000 individuals served. The purpose of the ERC is to help



teachers learn about and use NASA's educational resources and to provide Professional Development Workshops for in-service & pre-service teachers and the informal education community. ES provides student and public programs for formal and informal student groups through adventures in learning science, technology, and math through seeing, touching and doing. These workshops included NES and educator astronaut teachers as well as hundreds of other teachers from around the nation.

## Research and Technology Involvement

**Graduate Student Research Program (GSRP)** - Twelve graduate students participated in this program. Fellowships are

awarded for one year as training grants in the amount of \$24,000. Awards are renewable up to three years based on satisfactory academic advancements, research progress, and available funding.

**National Research Council (NRC)** - KSC hosted six participants. This program provides postdoctoral scientists and engineers of unusual promise and ability opportunities for research on problems, largely of their own choice that are compatible with the interests of the sponsoring laboratory or Center.

**NASA Summer Faculty RO** - Twenty two faculty and fifteen accompanying students spent the summer working in KSC labs with KSC researchers. KSC competed for and received a unique award from Exploration Systems Mission Directorate (ESMD) to fund a portion of these students and faculty.

**Space Grants** - Two Massachusetts Space Grant Consortium students and one Arkansas Space Grant Consortium student participated in the NASA Summer Internship Program. The National Space Grant College and Fellowship Program (also known as Space Grant) is a national network of colleges and universities working to expand opportunities for Americans to understand and participate in NASA's aeronautics and space programs by supporting and enhancing science, and engineering education, research and public outreach programs. The Space Grant national network includes over 850 affiliates from universities, colleges, industry, museums, science centers, and state and local government.

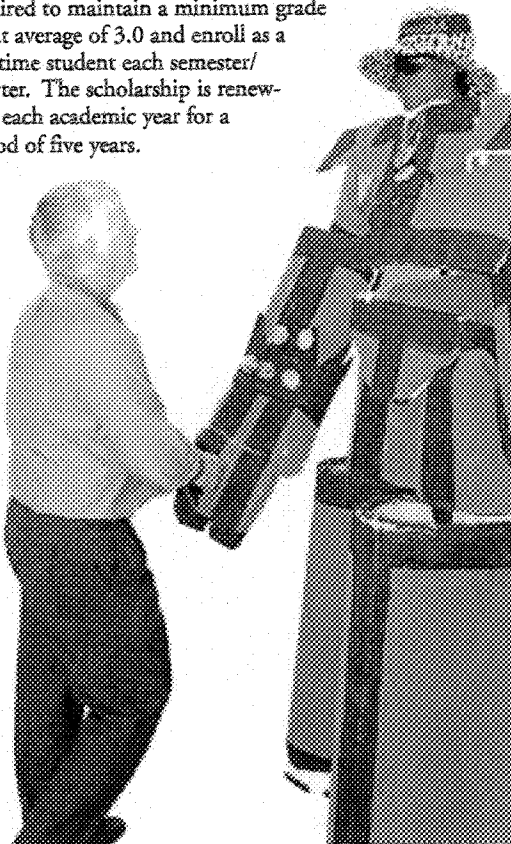
**Faculty Awards for Research (FAR)** - KSC hosted two FAR participants this summer. FAR program goals are to provide faculty from minority institutions with an opportunity to integrated the research and education components with the unique mission requirements of a specific NASA or JPL Center.

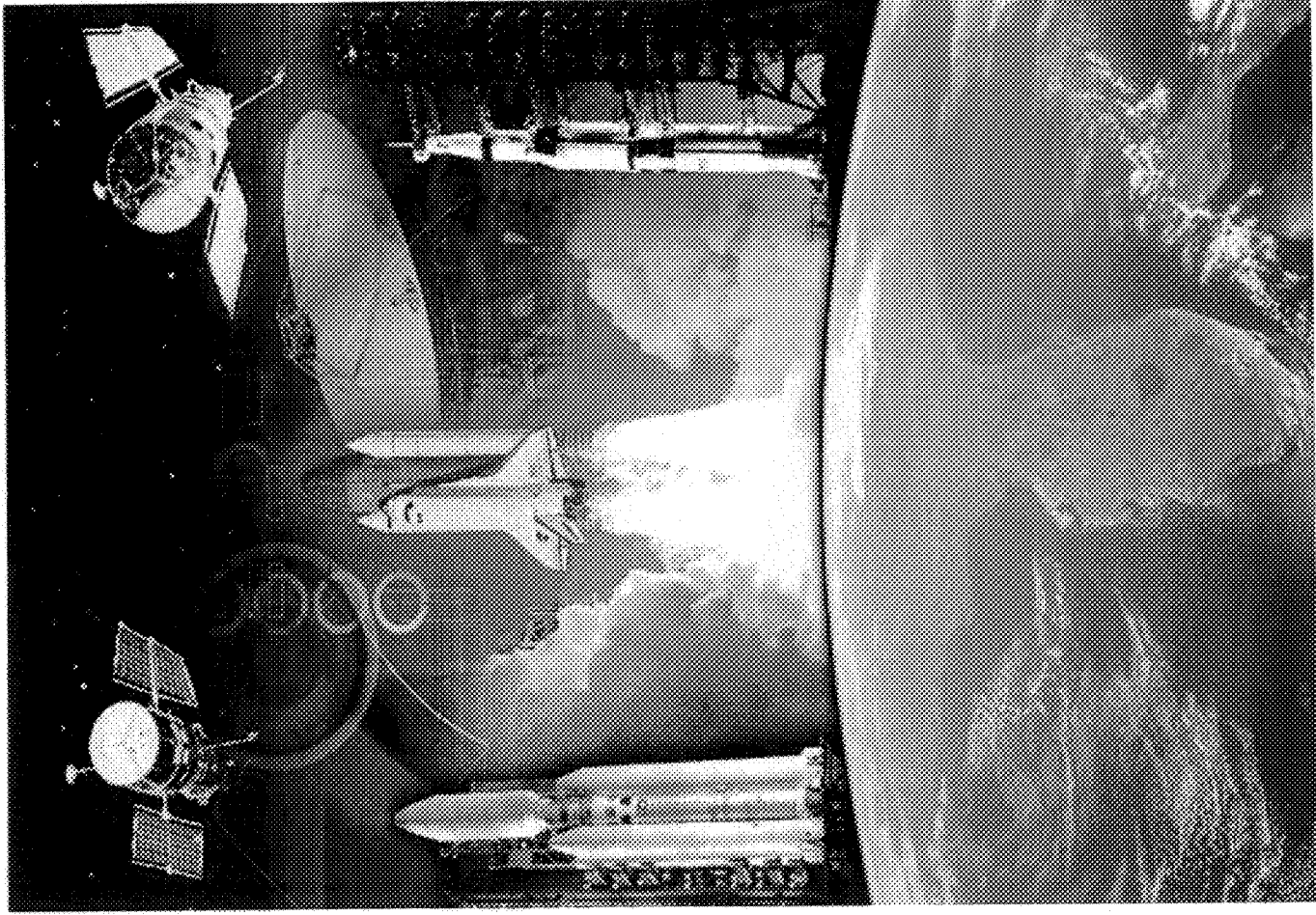
## Additional Activities

KSC education continues to develop e-education products such as:

- Virtual lab
- Enter the firing room
- Launch Service Program (LSP) website
- Kennedy Launch Academy Simulation System (KLASS)

Finally KSC continues to work with the informal education community, such as museums, science centers and planetariums.





# **Florida Space Institute a State of Florida Institute in the State University System**

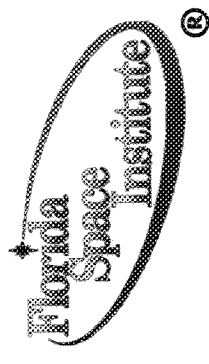
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**Description of FSI and  
Recommendations for  
Florida Space Initiative  
- Education and Research -**

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**Presented to:  
Commission on the Future of  
Space and Aeronautics in  
Florida**

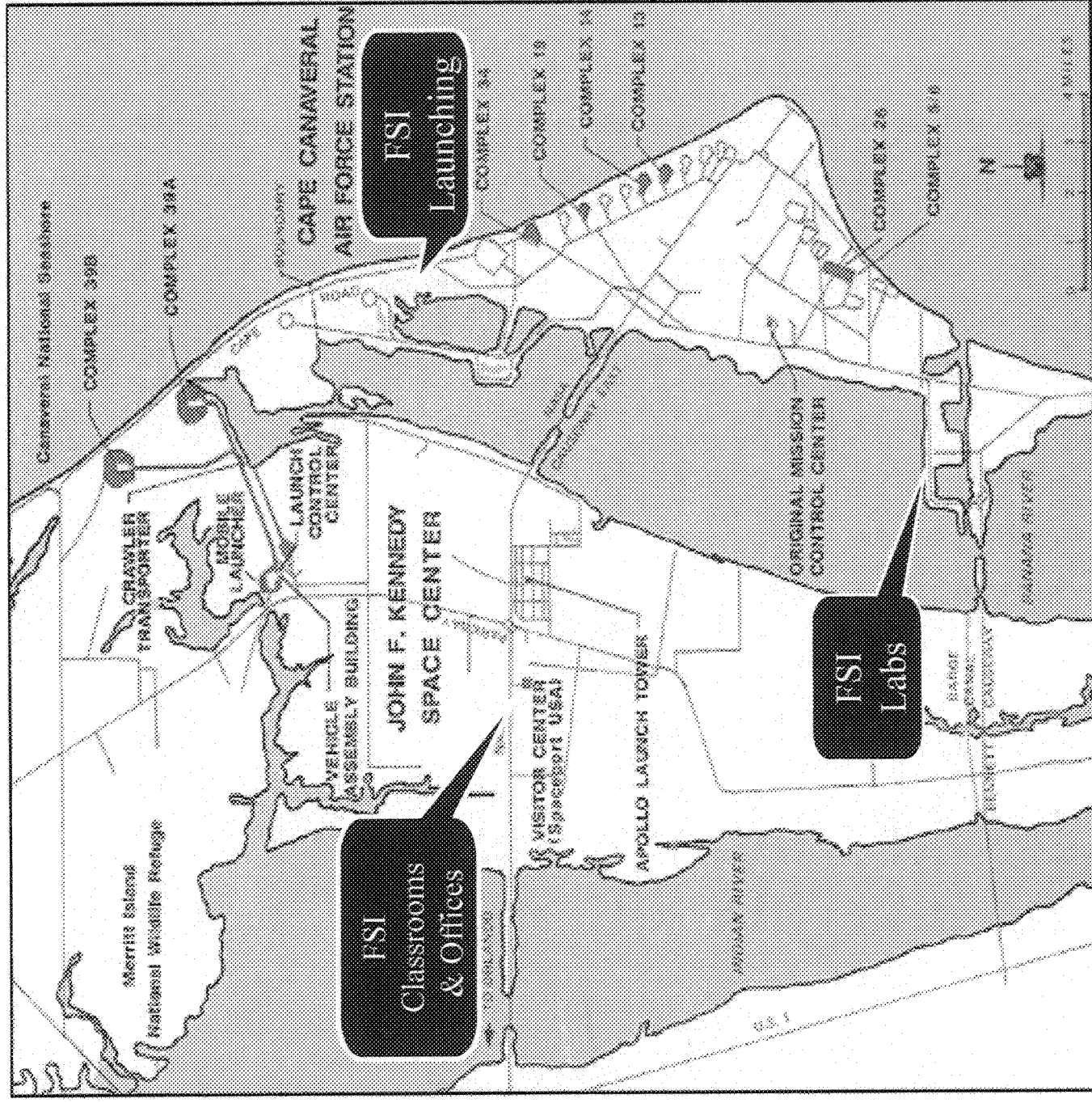
**November 18, 2005**



# Florida Space Institute

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**Operations:  
Kennedy Space  
Center  
&  
Cape Canaveral  
Air Force Station**



# **Florida Institutes and Centers within the State University System**

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- ☐ **University entities established to coordinate intra-institutional research, service and educational activities that supplement and extend existing such activities at the universities.**
- ☐ **Two types of institutes in State System either:
  - (1) State-of- Florida Institute or**
  - (2) internal university institute****



# **A “State-of-Florida Institute” has:**

---

- ☐ **Statewide mission**
- ☐ **Two or more State Universities**
- ☐ **Approved by Board of Governors**
- ☐ **MOU among participating schools that state host institution and procedures for institute**
- ☐ **Advisory Board**
- ☐ **Separate unit account in host university budget**
- ☐ **Spend funds appropriated to institute according to Legislature or university decisions**
- ☐ **Spend “other” funds from grants, fees and contracts**

# **Florida Space Institute (FSI)**

## **A State-of-Florida Institute**

**with a mission to:**

---

- ☐ **Support and expand Florida's space industry through university research and education relevant to payloads, satellites, and launch systems**
- ☐ **Facilitate science & research community access to Florida Space Authority, NASA, and the Air Force 45<sup>th</sup> Space Wing facilities**
- ☐ **Support NASA KSC, build on their leadership in spaceport technology**

# **Current Status of FSI**

## **-a broad multi-university institute-**

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- ☐ In 5<sup>th</sup> Year of Operation at space center as "State of Florida Institute"
- ☐ Report through Chair of ECE of College of Engineering
- ☐ 10 Member Schools -UCF, Embry-Riddle, FIT, Univ. of Miami, FAMU, USF, FAU, UF, Brevard CC, Broward CC
- ☐ Personnel resident at Space Center
  - ☐ 7 Faculty
  - ☐ 3 Engineering
  - ☐ Staff - 4 Administrative
  - ☐ 2 additional admin. in Research Pavilion
- ☐ Students taking classes through FSI facilities:

Fall/'04 - 140, Spring/'05 - 147, Summer/'05- 98



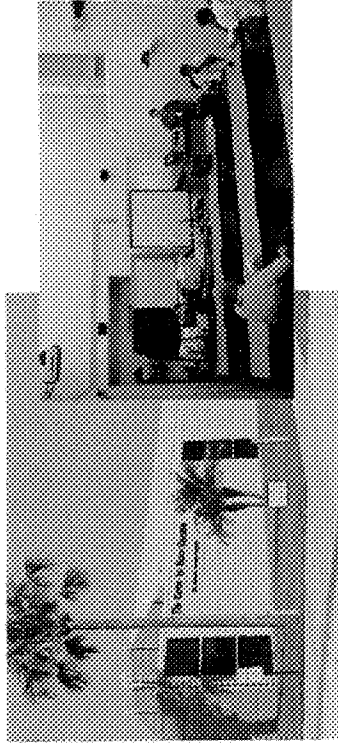
# **Areas of Expertise within FSI**

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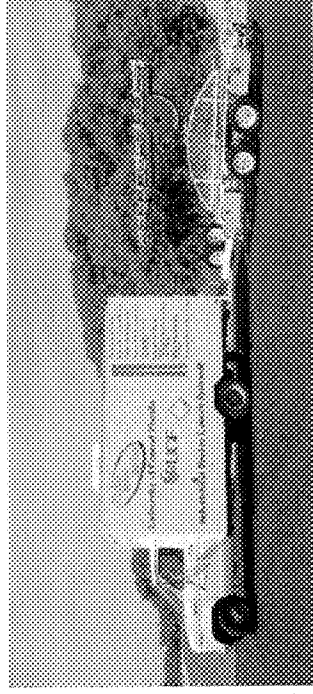
- ☐ **Space Weather/Physics**
- ☐ **Space Instruments**
- ☐ **Laser Communication**
- ☐ **Laser radar**
- ☐ **Propulsion**
- ☐ **Space Systems Technology**
- ☐ **Sounding Rockets**
- ☐ **Research Balloons**

# FSI Facilities: KSC and Cape

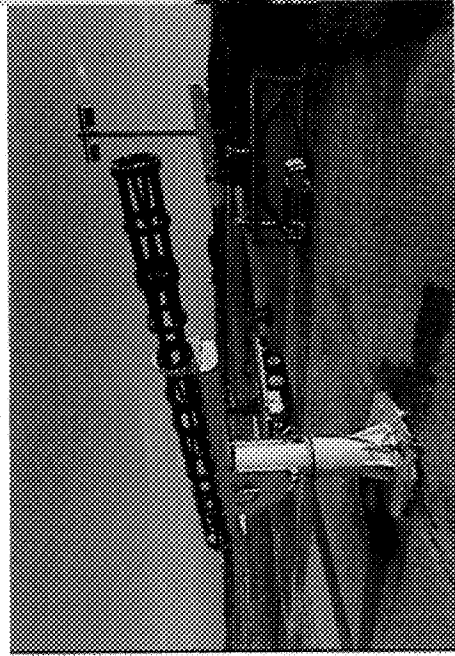
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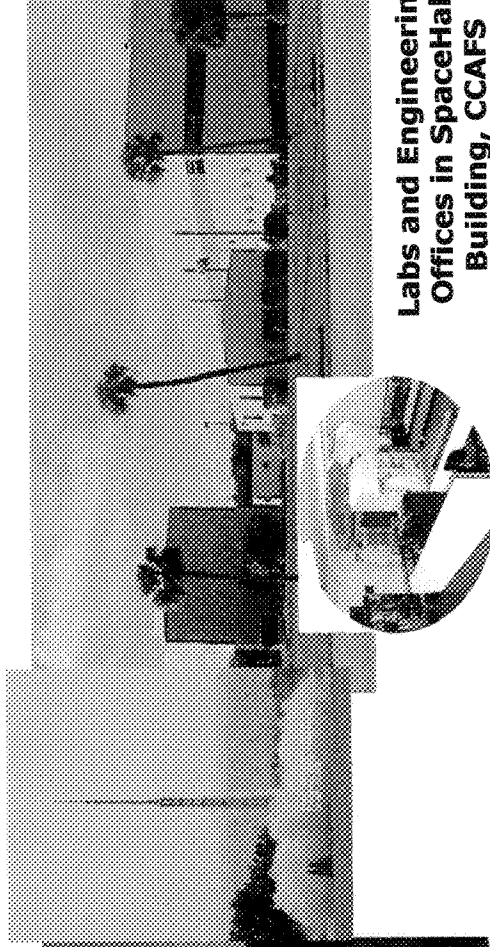
**Classrooms and faculty offices in Astronaut  
Memorial Foundation's Center for Space  
Education, KSC**



**Mobile Rocket Launch System**



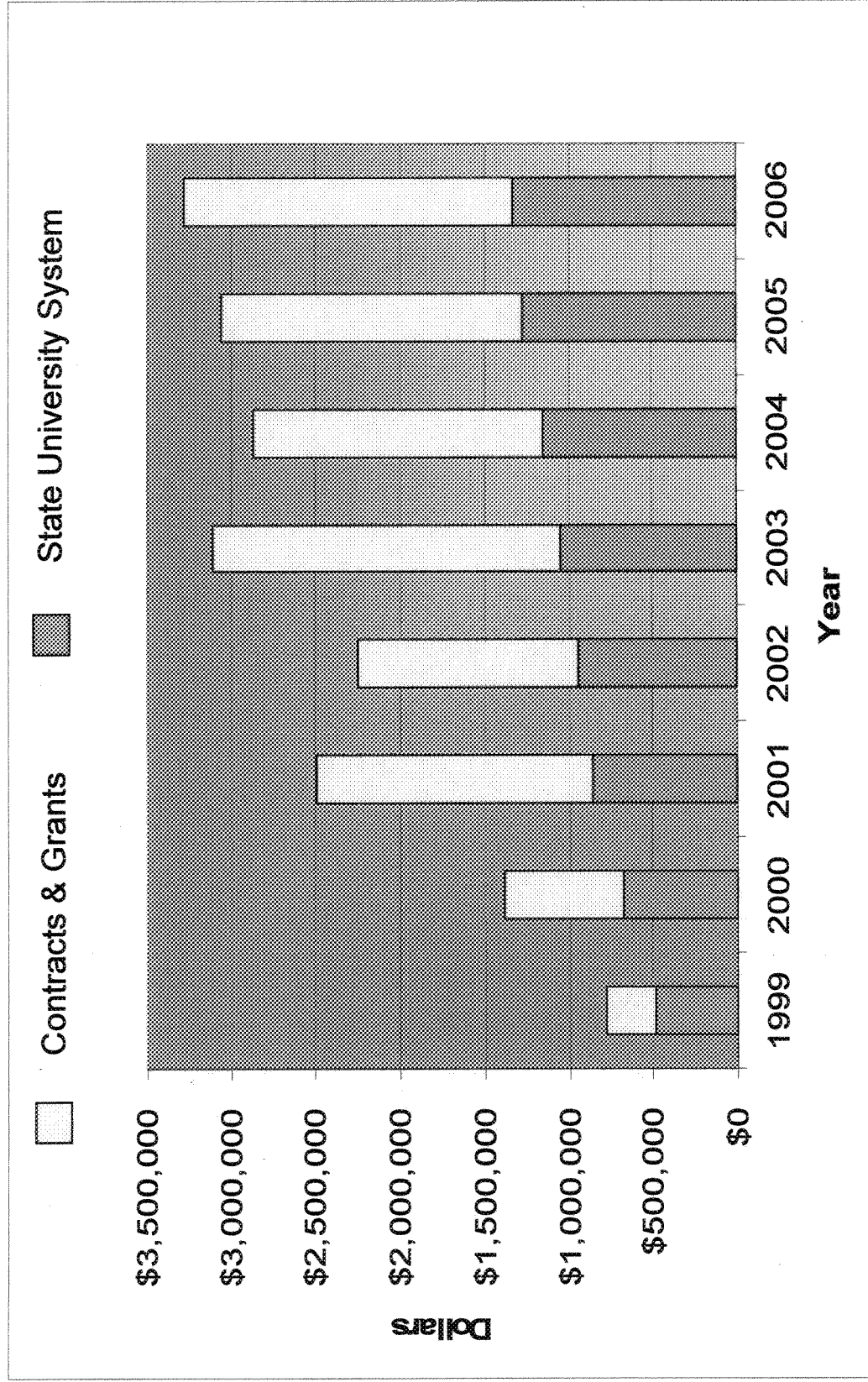
**Fixed Launchers at LC-47, CCAFS**



**Labs and Engineering  
Offices in SpaceHab  
Building, CCAFS**

# Historical Investment of State in FSI

## With Comparison to Contracts & Grants Received



(Note: 2006 C&G Projected)



# What are the Sectors of “In-Space” Activities?

Commercial Space	Government Space
<input type="checkbox"/> TV & Radio <input type="checkbox"/> Communications <input type="checkbox"/> Navigation <input type="checkbox"/> Weather <input type="checkbox"/> Imagery/Mapping <input type="checkbox"/> Tourism	<u>Civil (NASA/NOAA)</u> <input type="checkbox"/> Communications <input type="checkbox"/> Weather <input type="checkbox"/> Science <input type="checkbox"/> Exploration  <u>Military</u> <input type="checkbox"/> Communications <input type="checkbox"/> Imagery/Mapping <input type="checkbox"/> Navigation <input type="checkbox"/> Defense Systems

## **Technology Areas Needed for these Sectors:**

- ☐ **Microwave electronics & Antennae**
- ☐ **Power electronics & Energy sources**
- ☐ **Optical Systems & Photonics**
- ☐ **Heat Transfer**
- ☐ **Cryogenics**
- ☐ **Materials (macro properties)**
- ☐ **Mechanics & Dynamics & Applied Math**
- ☐ **Controls Systems/ Mechanical Mechanisms**
- ☐ **Computers – hardware & software**
- ☐ **Propulsion Systems**
- ☐ **Tribology**

# Academic Advisory Board

July 6, 2005

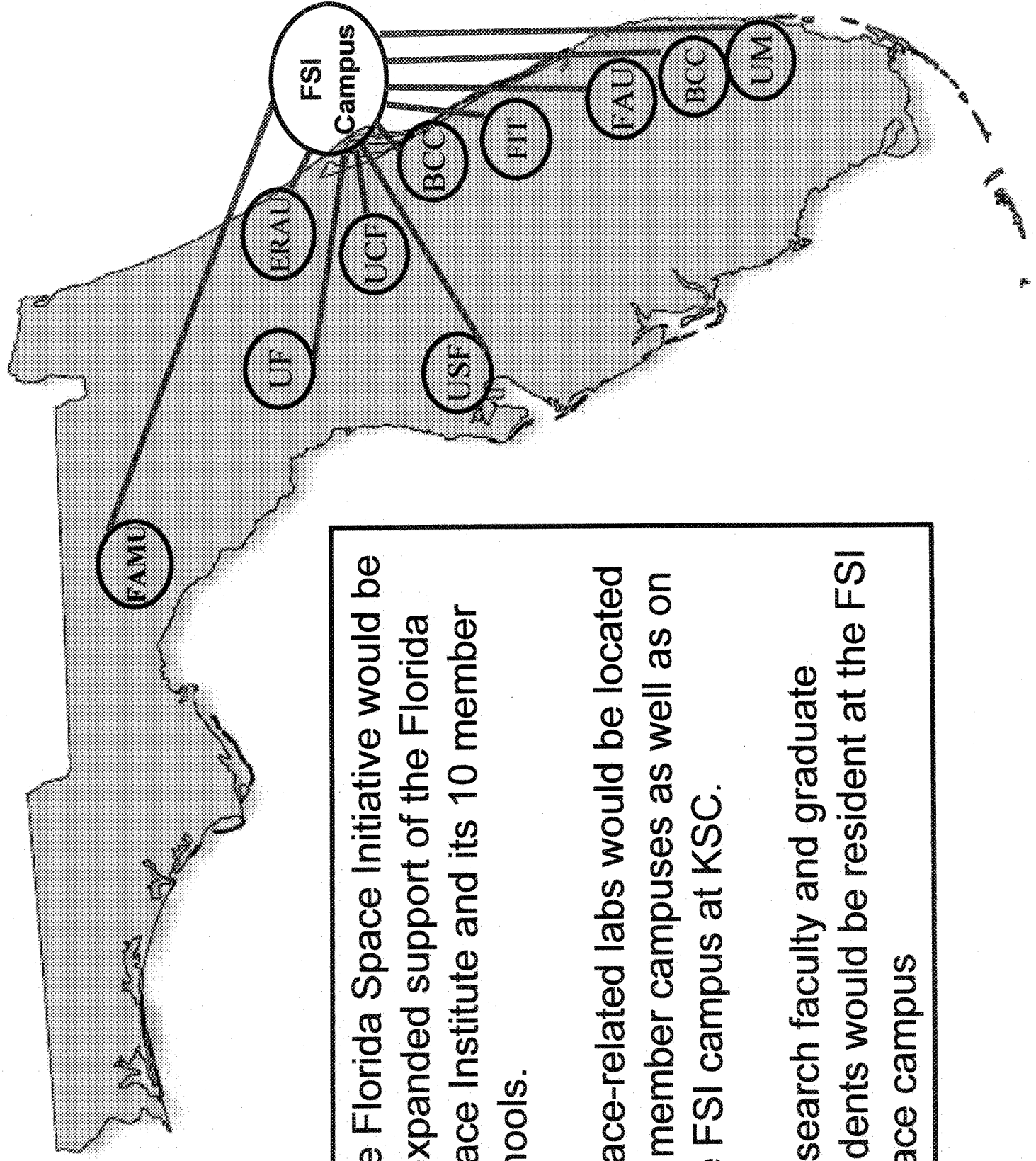
BCC, FAMU, UF, ERAU, USF, UCF, FIT, FAU, UM, BrCC



Lt Gov. Toni Jennings discussed Commission on Space



[illegible]



- The Florida Space Initiative would be a expanded support of the Florida Space Institute and its 10 member schools.
- Space-related labs would be located on member campuses as well as on the FSI campus at KSC.
- Research faculty and graduate students would be resident at the FSI space campus

# Hiring Eminent Scholars

---

- ❑ Endowment+start-up funds attract best scholars
- ❑ They will attract other strong scholars and researchers
- ❑ They will leverage \$ investment by attracting funded research and funding for more graduate students
- ❑ They will partner with Florida industry and Florida universities & colleges +transfer technology

Highly leverages \$ and ensures continuation of Space Initiative



# Florida Space Initiative

-expand and focus FSI research and education-

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Focus Areas: (1) Small Satellites, (2) Broadband Communications,

(3) Space Instruments

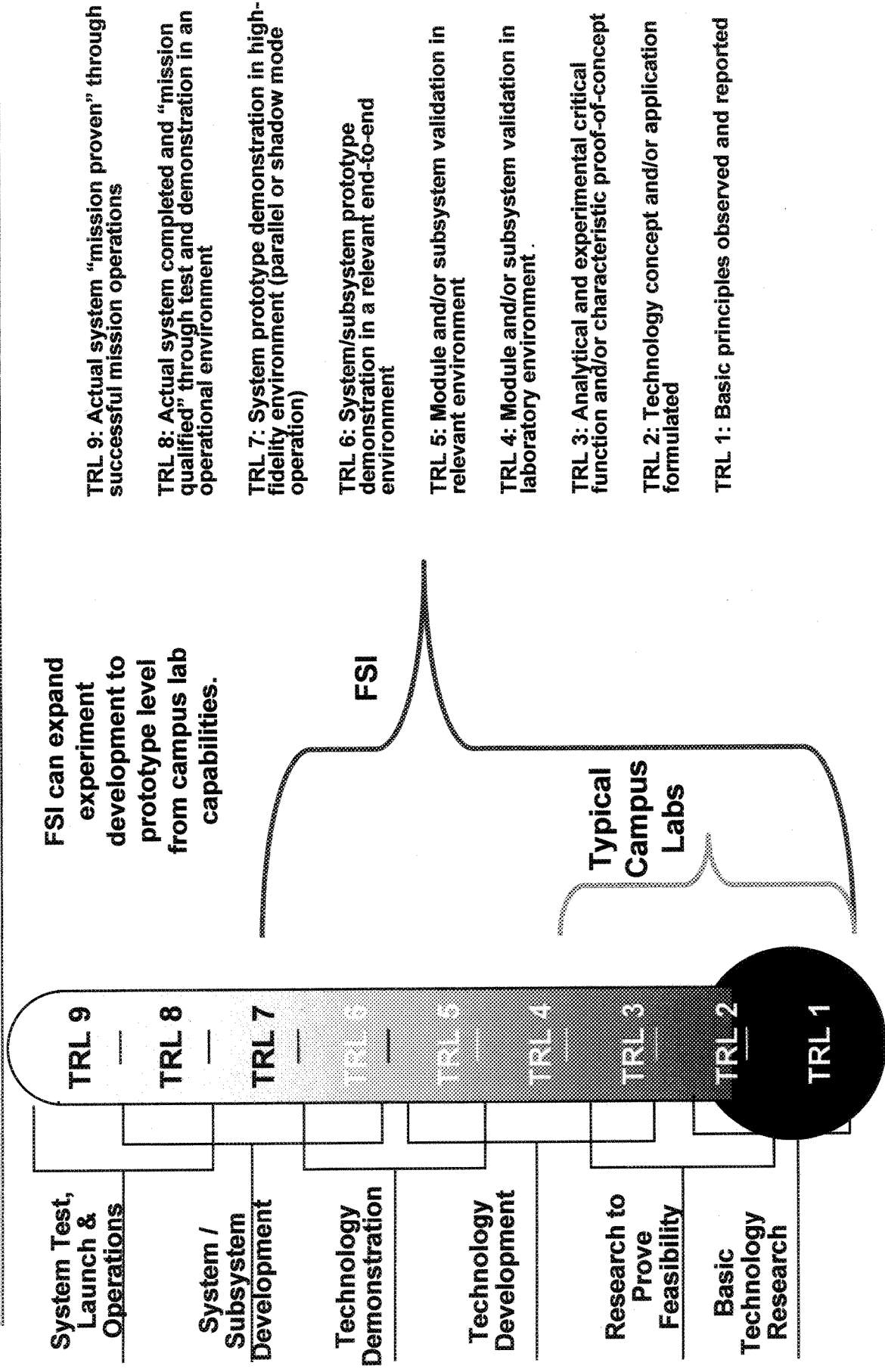
- ☐ Focused excellence in research and graduate education, structured to serve the space industry in the state.
- ☐ Capture space-related research funding in Exploration and Defense
- ☐ Leverage the investment in Florida Space Institute
- ☐ Leverage state resources via partnerships with Florida industry, KSC, 45<sup>th</sup> Space Wing, Florida Space Authority and the Space and Naval Warfare Center.
- ☐ Work with Florida based space corporations to help expand industry in State.
- ☐ Work with economic development groups to attract and retain space based businesses.

# **The Space Initiative Establishes FSI as a Focal Point for Space Education and Research**

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- ☐ **Develop capability to design and build small satellites to support the growing trend toward their use.**
- ☐ **Provide design, development and test bed for new concepts in broadband communications (terrestrial, ground-to-space, space-to-space).**
- ☐ **Create new opportunities for developing space instruments for use in orbital, sub-orbital, and near-space applications.**
- ☐ **Leverage research contracts & grants to attract industrial partners.**
- ☐ **Assist with the transition of technology to existing space industry, encourage new start-up industries.**

# Space Initiative will bring FSI research to higher Technology Readiness Levels



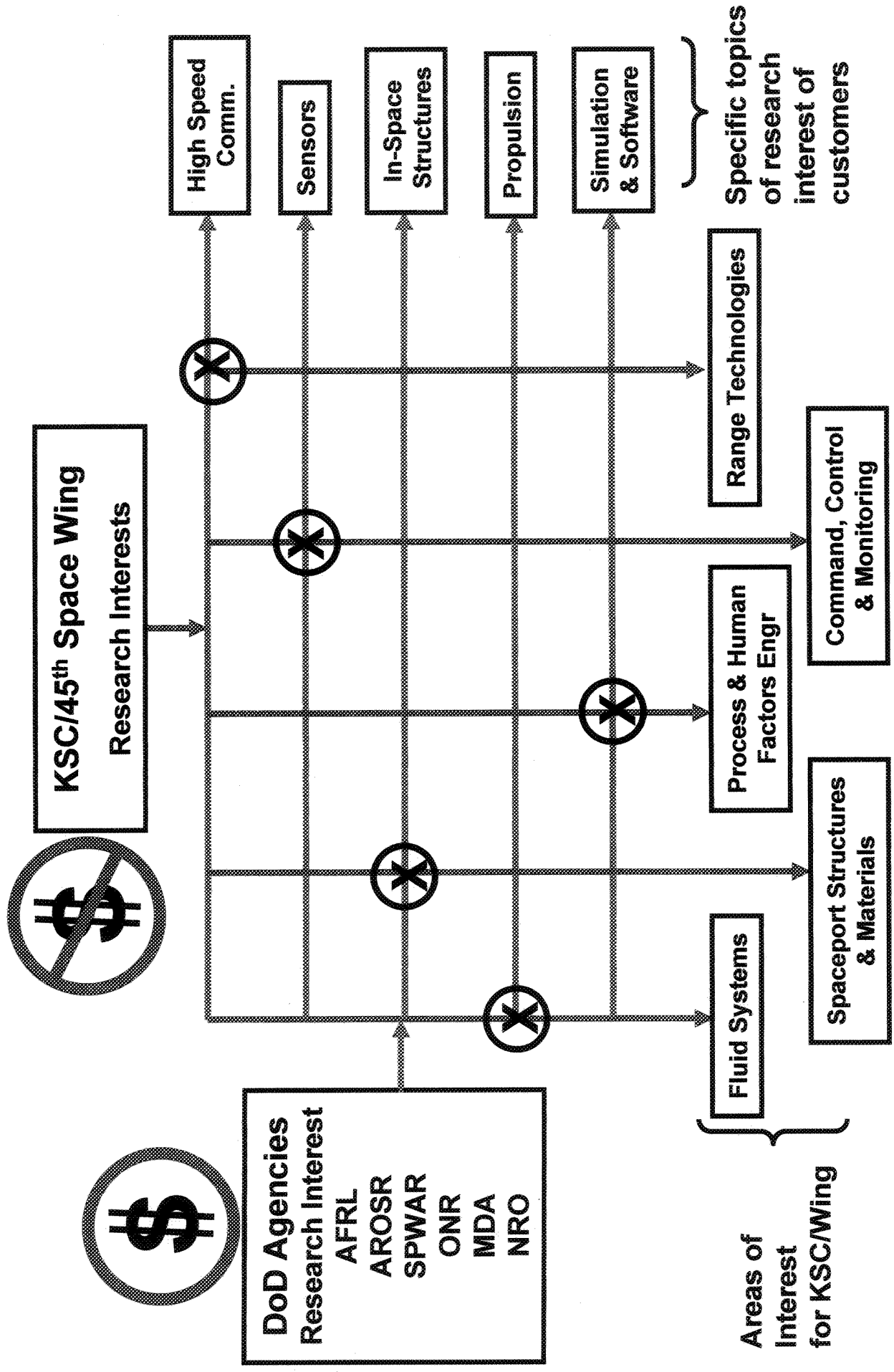
# **The Strategy For Research Program**

---

- ❑ Focus on spaceflight at FSI**
- ❑ Focus on Science that can be supported by spaceflight**
- ❑ Focus on engineering technologies supported by spaceflight**
- ❑ Find intersections of KSC & 45<sup>th</sup> Space Wing with “paying customers”**
- ❑ Take research from TRL-1 to TRL-7**



# KSC has facilities to support research interests of "Others"



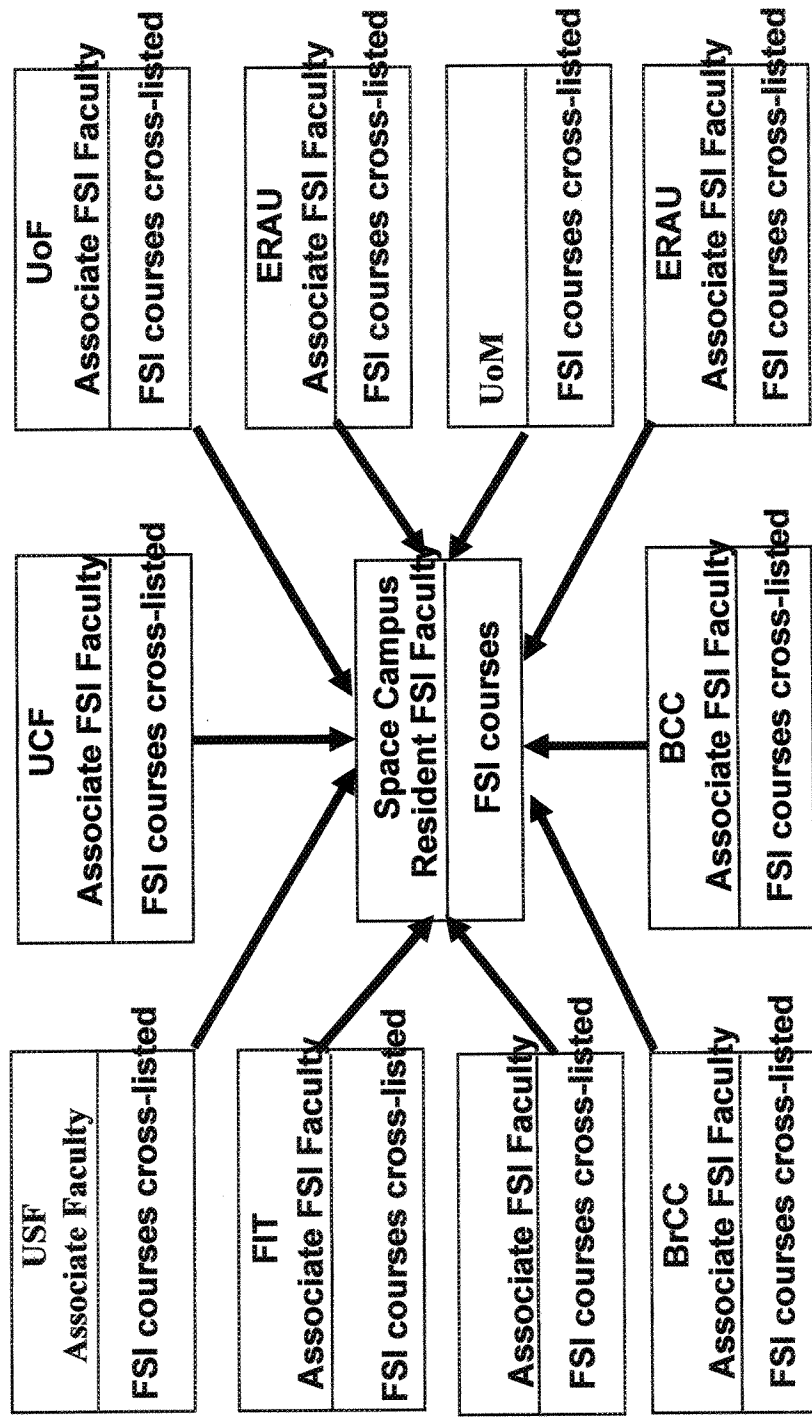
# Strategy for Education

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- ❑ Focus on “taking” theory to the field
- ❑ Hands-on education within an operational space environment
- ❑ Interdisciplinary projects
- ❑ Focus on resident M.S. degrees with space-related theses
- ❑ Support resident Ph.D.space related degree program
- ❑ Summer short-courses for industry and students

# Students and Faculty “Flow” Between University Campus & Space Campus

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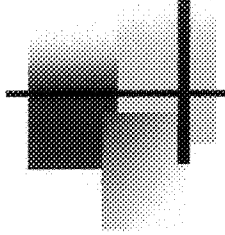
# **What can FSI schools do jointly?**

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- ❑ Senior design projects**
- ❑ Joint space-related research projects that need space flight or field experimentation**
- ❑ FSGC funded projects, scholarships and fellowships**
- ❑ Joint educational classes, on-site or video streamed**



# Space Research, A Key to Attracting Talent

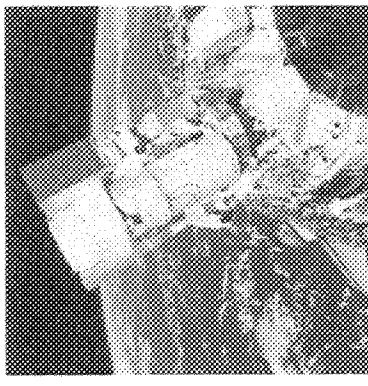
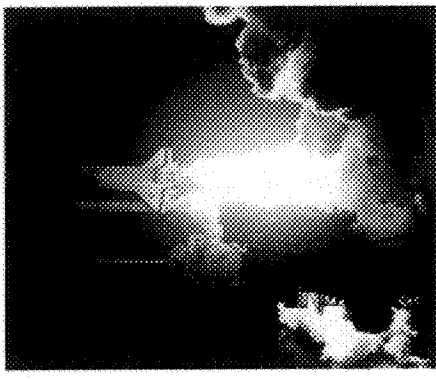


**"Investment Follows Talent"**



# Florida's Role in Space

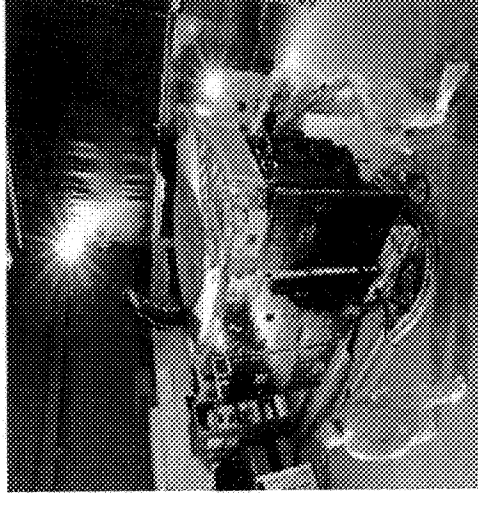
- Florida plays a vital and historic role in the nation's space program: launching missions into space; Florida has had no major role in the design and development of our nation's space programs
- Companies like Harris, Honeywell, Raytheon, Pratt & Whitney, Dynamac, and others have diversified the state's role in promising ways
- With a few notable exceptions, Florida's universities are not involved in high value space research roles
- High value roles such as; mission management, spacecraft and instrument design and development, science program definition and scientific analysis are located in other states where universities have become major players
- As the following examples illustrate ...



# NASA Science Missions

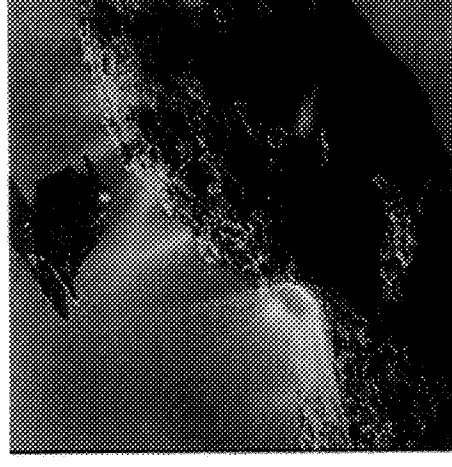
- Aura – July 2004

- Built in California in partnership with
  - University of Colorado
  - CalTech/JPL
  - Harvard
  - University of Denver



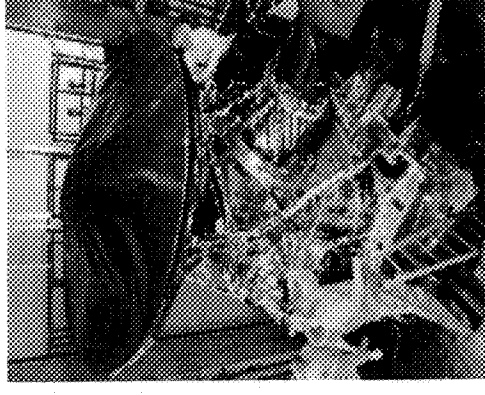
- Deep Impact – January 2005

- Built in Colorado in partnership with
  - University of Maryland
  - CalTech/JPL

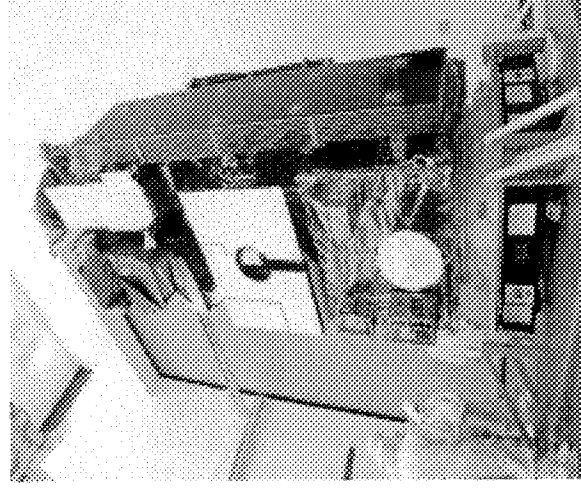


# NASA Science Missions

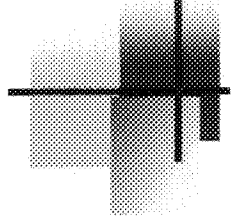
- Mars Reconnaissance Orbiter – August 2005
  - Built in Colorado in partnership with
    - CalTech/JPL
    - University of Arizona
    - Johns Hopkins
    - MIT
    - George Washington University



- CloudSat – August 2005
  - Built in Colorado in partnership with
    - Colorado State University
    - University of Colorado
    - CalTech/JPL
    - University of Maryland
    - University of Utah
    - University of Wyoming
    - University of Massachusetts





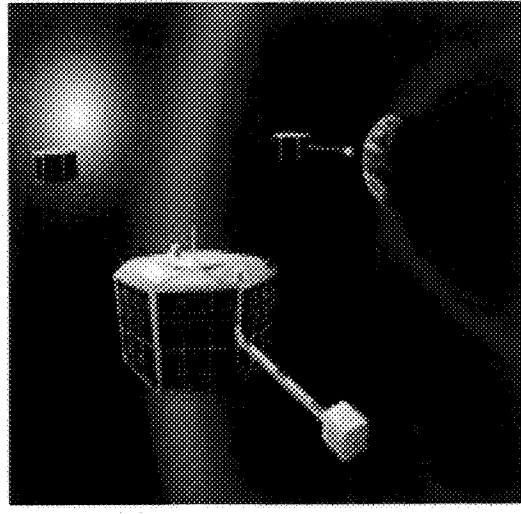


# NASA Science Missions

- Pluto New Horizons – Jan. 2006
  - Built in Maryland in partnership with
    - Johns Hopkins
    - SouthWest Research Institute
    - CalTech/JPL
    - Stanford
    - University of Colorado

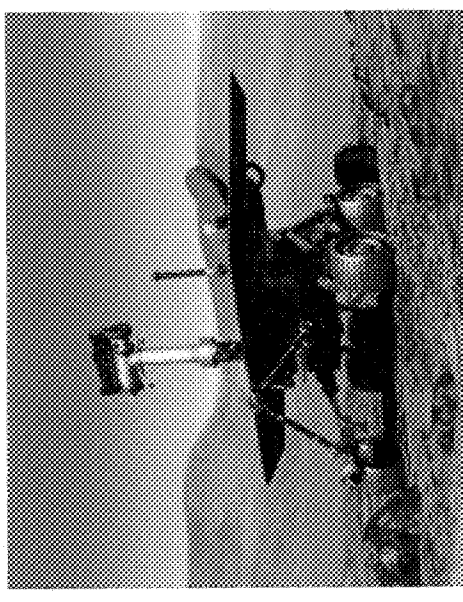
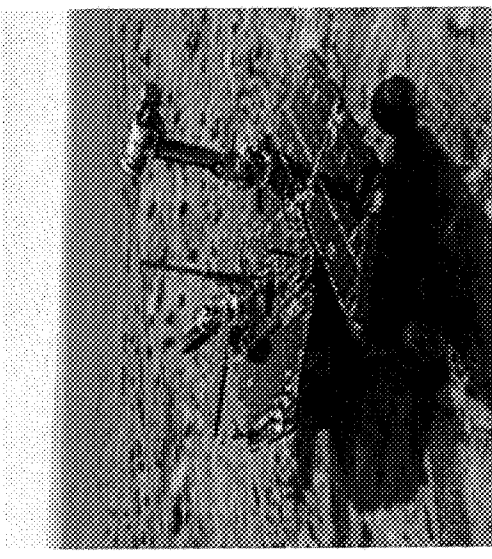


- Space Technology 5 – Feb. 2006
  - Built in Maryland in partnership with
    - University of California
    - University of New Mexico



# NASA Science Missions

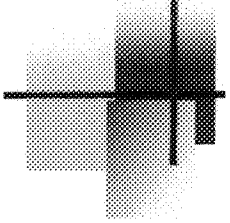
- Spirit & Opportunity Mars Rovers (2003)
  - Built in California in partnership with
    - Cornell University
    - Washington University
    - University of Nevada
    - Arizona State University
    - University of Chicago
    - MIT
    - CalTech/JPL
    - Harvard University
    - Ohio State University
    - University of Alabama
    - University of Tennessee
    - State University of New York



# Talent Brings Opportunity - Brings Talent

- University of Colorado
  - OSO-8 control room at CU
  - Earth observation data available
  - Sounding rocket instrument development
  - Sounding rocket observations of Venus
  - Pioneer Venus UV spectrometer control room at CU
  - Planning and execution of UV observations of Venus
  - IUE satellite observations of Venus
- Johns Hopkins University
  - IUE observations of planets
  - Sounding rocket instrument development (Two)
  - Sounding rocket observations of Jupiter's plasma torus and several calibration stars
  - Development of HUT and the Astro observatory
  - Flew on two space shuttle missions with Astro
  - Adaptive Optics Coronagraph (AOC) instrument development
  - Access to major observatories for the AOC
  - HST observing time available

Florida can create this type of environment!



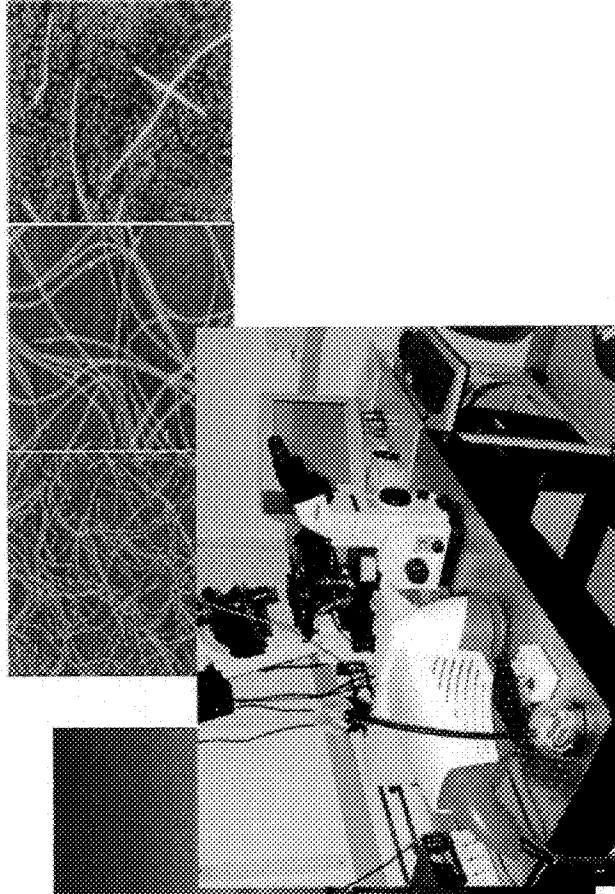
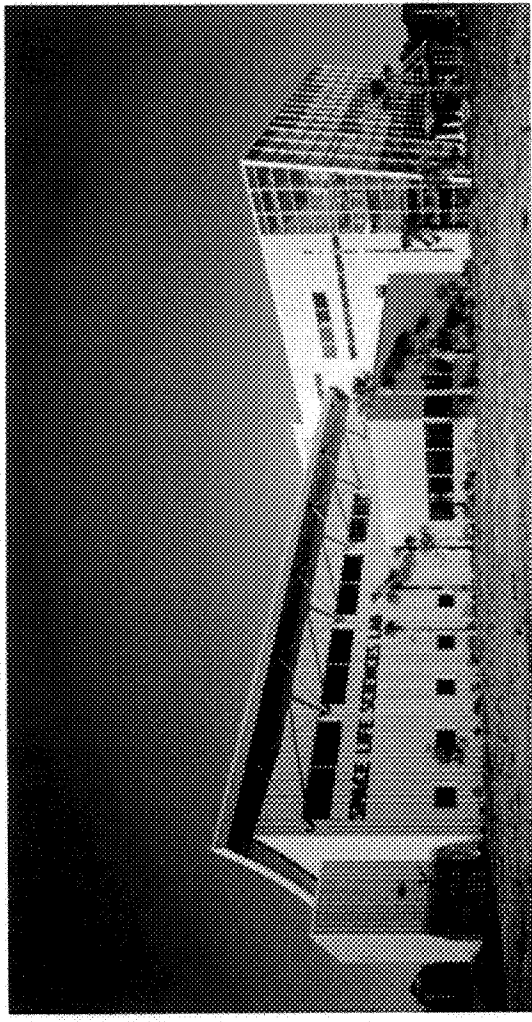
## FSRI Background

- Created in the Florida Statutes (1999)
  - Implementing a recommendation of the 1988 Governor's Commission on Space
- Industry-majority board of directors
  - Responsive to industry needs
- Industry-Driven Center for Space Research
  - Co-manage SLS Lab with NASA – with a UF led consortium
  - Develop initiatives for the International Space Station
  - Partner with NASA on space research (environmental monitoring, agriculture, aquatics, space resource utilization, and spaceport technologies)
- Develop workforce & education programs
- Set the direction of Florida's space research agenda



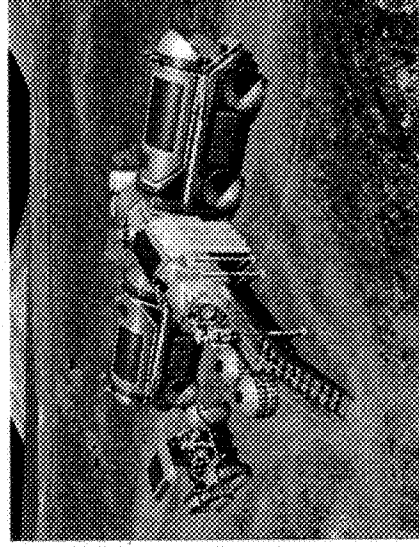
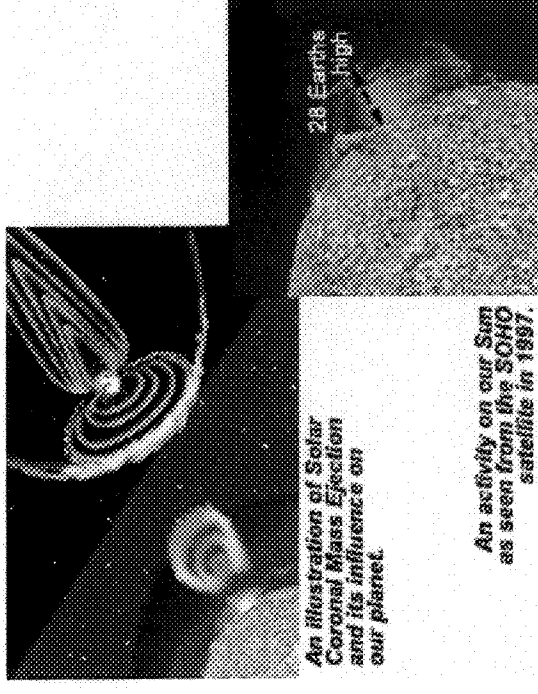
# Space Life Sciences Lab

- A Key State Facility for:
  - Attracting new talent
  - Developing a space research agenda
  - Supporting university research
  - Attracting entrepreneurs



# Sustained Human Space Exploration

- Radiation damage and protection
- Sustained loss of bone mass
- In-situ resource utilization technology
- Moon/Mars spaceport technology
- Bioregenerative life support



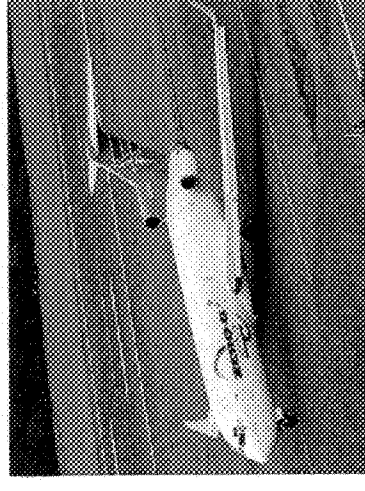
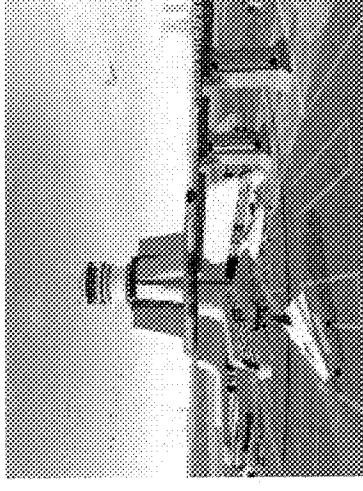
The figure consists of three main parts. On the left is a large grayscale photograph of a person's face and neck, oriented vertically. To the right of this is a schematic diagram of a rectangular object, also oriented vertically. The diagram has a total height of 100 and a total width of 100. It is divided into three horizontal sections: a top section of height 10, a middle section of height 40, and a bottom section of height 50. The middle section is further divided into three vertical sections of widths 10, 40, and 50. A small inset image of a person's face is located at the bottom right of the figure.

- 
- Figure 1(a) is a black and white photograph showing the experimental setup. It includes a beaker containing a reaction mixture, a magnetic stirrer bar, and a thermometer. The setup is placed on a laboratory bench. Figure 1(b) is a line graph with the y-axis labeled 'DEGREE OF POLYMERIZATION (DP)' ranging from 0 to 100 and the x-axis labeled 'CONCENTRATION OF MONOMER (M)' ranging from 0 to 1.0. The graph shows a series of data points connected by a line, indicating a positive correlation between monomer concentration and the degree of polymerization. The data points are approximately as follows:
- | Concentration of Monomer (M) | Degree of Polymerization (DP) |
|------------------------------|-------------------------------|
| 0.0                          | 0                             |
| 0.1                          | 10                            |
| 0.2                          | 20                            |
| 0.3                          | 30                            |
| 0.4                          | 40                            |
| 0.5                          | 50                            |
| 0.6                          | 60                            |
| 0.7                          | 70                            |
| 0.8                          | 80                            |
| 0.9                          | 90                            |
| 1.0                          | 100                           |

- 
- Diagram illustrating the components and dimensions of the AFM system:
- AFM Box:** The main housing, with dimensions 12 cm (width), 12 cm (depth), and 12 cm (height).
  - CCD Camera:** Mounted on top of the AFM box.
  - AFM Head:** The scanning head, positioned below the CCD camera.
  - Cartridge Door:** A component that allows access to the sample cartridge.
  - Rubber Tube for Vibration Isolation:** A tube that supports the cartridge door and provides isolation from vibrations.
  - Step Motors:** Motors that drive the movement of the cartridge door.
  - Sample Cartridge:** A circular disk containing the sample, shown with a grid of dots.

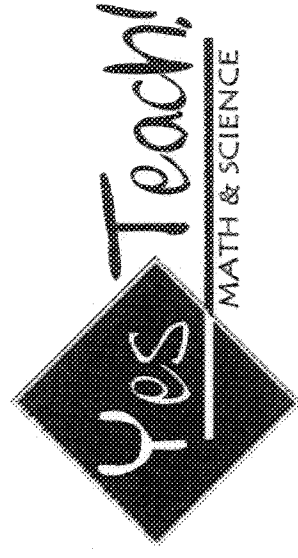
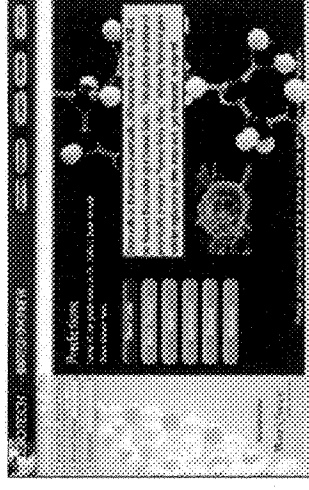
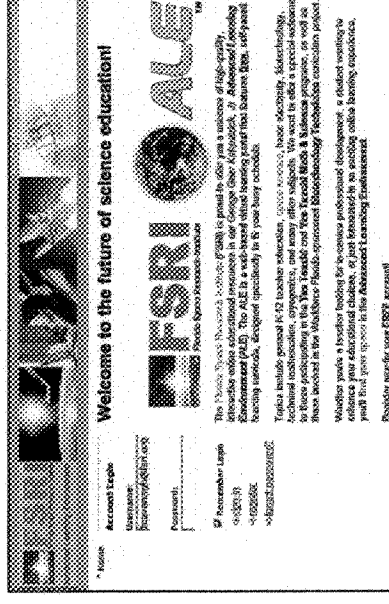
# Research Program Development

- Spaceport & Range technology
  - Technology demonstration/ qualification for range modernization
- The ZERO-G corporation in partnership with NASA is operating microgravity flights from the Shuttle Landing Facility
  - Supported by FSRI teacher professional development program
  - FSRI experiment flown on one of the first flight from the SLF
  - ZERO-G and FSRI have established a partnership to provide research flights and research support for Florida researchers



# Advanced Learning Environment

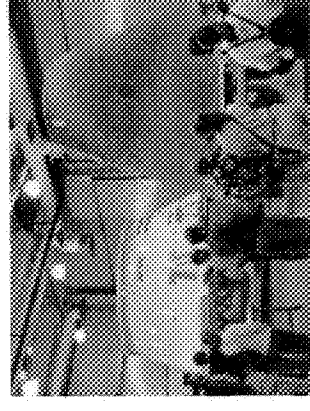
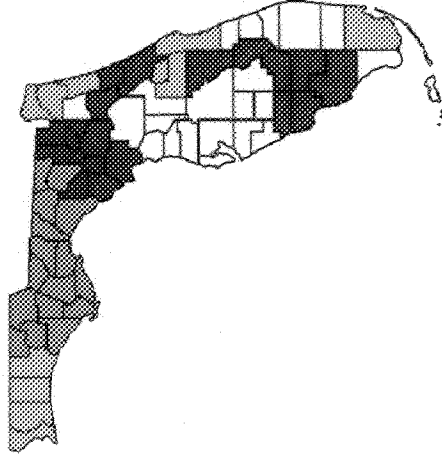
- Web-based training tool for aerospace, biotech, and teacher professional development (\$2.0M investment by NASA & WFI)
- FREE ACCESS to courseware
- Over 100 hours available
  - Space Science (15 hrs)
  - Engineering/Technical (22 hrs)
  - Cryogenics Engineering (3 hrs)
  - Yes Teach! 1st Class Tutorial (10 hrs)
  - Basic & Technical Math (25 hrs)
  - Yes Teach! Math & Science (20 hrs)
  - Biotechnology (42 hrs)
- Yes Teach! Math & Science
  - ICUF/FICF partnership with FDOE MSP funding
  - FSRI budget: \$289K
  - 25 hrs of Teacher Education

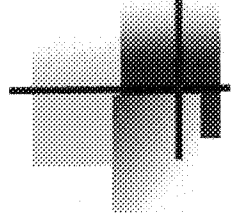




# Teacher Support for Math & Science

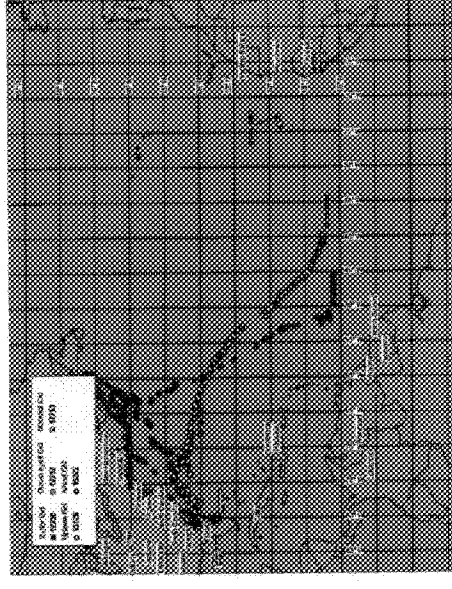
- Statewide professional development program for math & science teachers
- Increase use of aerospace themes and resources in their classrooms
- Regional network of Aerospace Education Mentors
  - Growing toward statewide coverage (see map)
  - Partnership with NASA and several universities
- Supported by five competitively awarded FDOE grants of federal funds totaling ~\$2.8M
- Augmented by ~\$500K in grants from USDOL and WFI

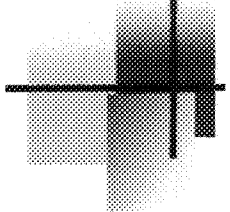




# Florida/NASA Matching Grant Program

- Encourages university partnerships with industry and NASA
- Annual solicitation with strategic focus areas
  - Established with input from industry and NASA
- Over \$2.4M awarded since 2000
  - More than half of funding from NASA
  - Limited funding allows only modest grant awards (\$10K - \$40K)
- Grants have supported projects at many of Florida's universities
- Also supports education projects

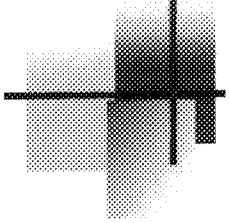




## Florida/NASA Matching Grant Program

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■ State Contribution	\$1,089,000
■ Florida Space Grant Contribution	\$1,369,000
■ Matching funds generated	\$1,308,726
■ Industry Participants	24
■ Faculty	81
■ Graduate Students	53
■ Undergraduate Students	17
■ Number of Publications	53
■ Follow-on Proposals funded	13
■ Total Amount Won Through Follow-on Proposals	\$1,656,277



## Statewide Distribution of Grants

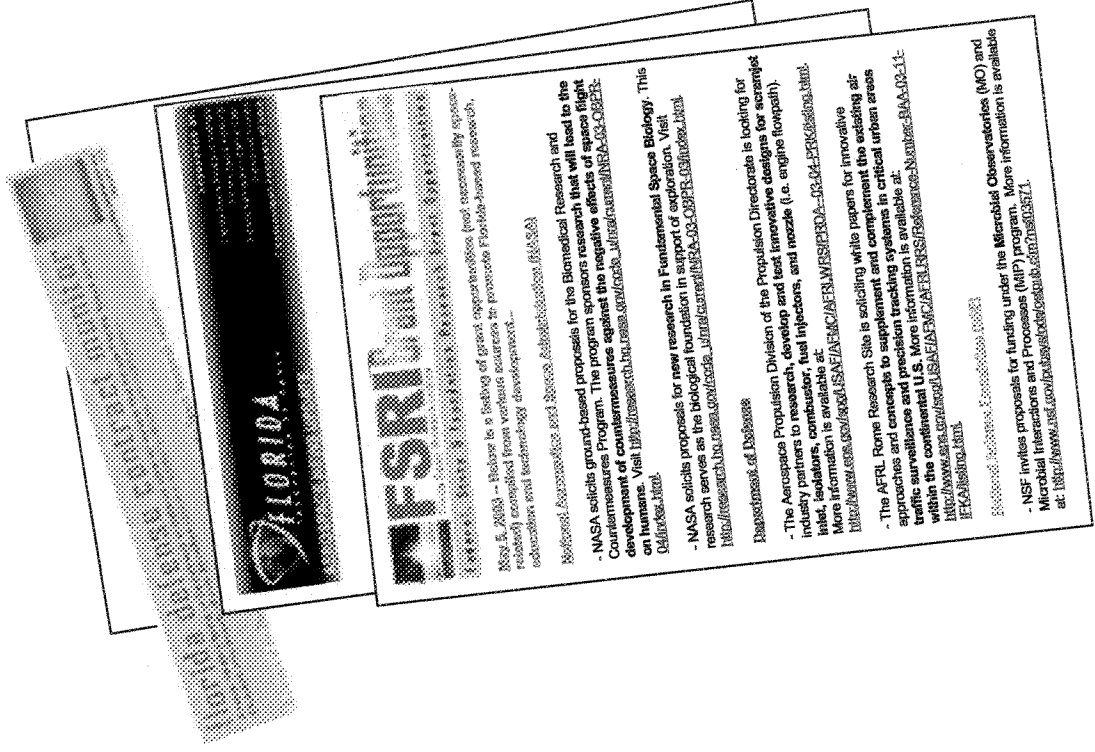
Institution	# of awards	Total \$ of awards
■ Brevard Community College	1	19.8 k
■ ERAU	9	118 k
■ FIT	15	328 k
■ UCF	23	557 k
■ UF	11	240 k
■ FSU/FAMU	5	127 k
■ FIU	1	25 k
■ FGCU	4	48 k
■ UMiami	4	94 k
■ UNF	3	30 k
■ USF	4	85 k
■ NSU	1	23 k

# Promoting Growth

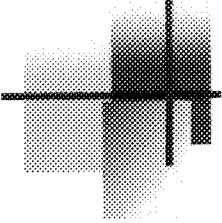
- Statewide/national outreach and promotion

- Bi-weekly research grant/contract opportunity alerts
- Weekly updates to industry leaders on space industry news and trends
- Monthly updates on DOD contract awards

Tremendous positive feedback from recipients







## FSRI Goal & Budget

- Bring Florida the type of entrepreneurial activity associated with space research and development seen in other states
  - *investment follows talent!*
- FSRI's annual budget from OTTED has been \$800K with a total investment since inception of \$3M
- FSRI's total annual budget is about \$1.5M with a total budget since inception of \$5.4M
- This investment has leveraged an additional amount from NASA and other sources of around \$2.5M



# FSRI News Release

Florida Space Research Institute

JANUARY 9, 2006

## **FSRI AND FLORIDA TECH TO EXPAND LIFE SCIENCES RESEARCH IN STATE LAB** **Weldon Secures \$1.3 Million NASA Grant for 2006**

CAPE CANAVERAL SPACEPORT -- The Florida Space Research Institute (FSRI) and the Florida Institute of Technology will collaborate on a space life sciences research program under a \$1.3 million grant secured by Congressman Dave Weldon in NASA's FY-06 budget. The collaboration will support ongoing programs within the state's Space Life Sciences Lab at Kennedy Space Center, including research aimed at mitigating the negative health effects of long-duration space flight.

"Certain health issues must be better understood before we send astronauts on long-duration missions to the Moon and Mars," said Congressman Weldon, who serves on the appropriations committee responsible for NASA's budget. "As a physician, I believe we must develop countermeasures to prevent or minimize the effects of radiation, bone demineralization, muscle atrophy, and other problems associated with human space flight. Research funded under this NASA grant to FSRI and Florida Tech will support the vision for space exploration."

The NASA grant will support joint faculty appointments between FSRI and Florida Tech within the SLS Lab, support existing biomedical and other life support technology projects within the facility, and enable research by other Florida universities and companies under FSRI's Florida/NASA Matching Grant Program. FSRI, Florida Tech and the Economic Development Commission of Florida's Space Coast will continue to work closely together to leverage the research activity to continue their successes in the expansion of aerospace and biotech programs in the state.

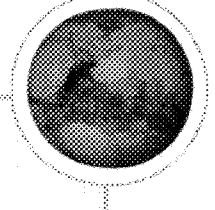
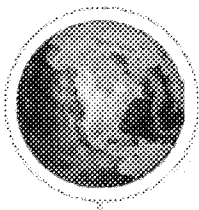
Florida Tech was founded in 1958 in Melbourne, Florida, to provide continuing education to professionals working in the space program at what is now Kennedy Space Center. The independent university now occupies 130 acres, and is consistently listed as one of America's best colleges in U.S. News & World Report.

FSRI, which co-manages the Space Life Sciences Lab with NASA at the Cape Canaveral Spaceport, was established by Governor Jeb Bush and the Florida Legislature to promote collaboration among the state's academic institutions, industry, and federal space agencies to support space-related education, training, research and technology development.

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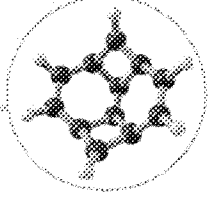
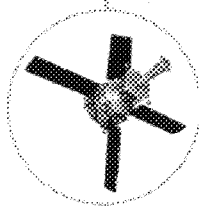
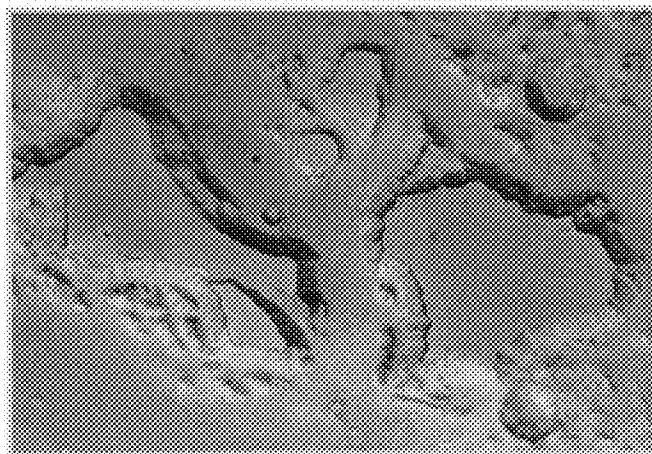
Contact:

FSRI - Edward Ellegood, 321-452-2653, ext. 204



## **2005 Annual Report**

**Presented to  
Governor Jeb Bush  
Lieutenant Governor Toni Jennings  
Senate President Tom Lee  
House Speaker Allan Bense  
Education Commissioner John Winn**



## Contents

FSRI in 2005	3
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Recommendations for 2006 & Beyond	10

**FSRI Supports Study of Spiritual Support for Exploration Programs**  
February 2005 — Astronauts involved in future missions to the Moon and Mars could receive the same type of religious and spiritual support that the military provides to U.S. soldiers. The concept is currently being studied by a NASA researcher as part of his two-year assignment to FSRI.

**FSRI Expands Learning Environment, Provides No-Cost Access**  
January 2005 — A combination of federal and state grants has allowed FSRI to significantly upgrade its Advanced Learning Environment to support other critical workforce and education needs in Florida, including training for biotechnology workers and science and math teachers. In addition to expanding ALE's content, FSRI is now providing unprecedented no-cost access to the system.

**FSRI Expands Teacher Programs for Space Education, Workforce**  
April 2005 — A critical shortage of Florida mathematics and science teachers is contributing to national concerns about the aerospace industry's aging workforce. To tackle both issues, the Florida Space Research Institute (FSRI) has expanded its programs to recruit and prepare Florida educators to teach mathematics and science using aerospace themes.

**FSRI & NASA Partner on Lunar Technology Challenge**  
May 2005 — FSRI and NASA have partnered to sponsor a \$250,000 Moon Regolith Oxygen (MoonROx) prize to advance the state of the art in oxygen production from lunar soil. The cash prize will be awarded to the first team to successfully demonstrate a system capable of extracting a pre-determined amount of oxygen from lunar regolith within a limited period.

**Space Education Wins Big in Math & Science Grant Program**  
May 2005 — Three space-focused education proposals have been selected to receive federally funded Math & Science Partnership (MSP) grants worth \$1.945 million. FSRI, Florida Gulf Coast University (FGCU), the North East Florida Educational Consortium (NEPEC), and the Panhandle Area Educational Consortium (PAEC) are partnered on the projects, which are designed to expand the use of NASA and other aerospace resources and themes by mathematics and science teachers in 30 Florida counties.

**Fifteen Projects Selected for Florida/NASA Grants**  
June 2005 — FSRI and the NASA-sponsored Space Grant Consortium selected 15 space research and education projects to receive over \$329,000 in grant funding under the Florida/NASA Matching Grants Program. The grants will combine federal and state funds for projects involving space exploration, and spaceport and range technologies, and space education.

**FSRI and NASA Select Exploration Design Competition Winner**  
May 2005 — FSRI and NASA selected a team from the Massachusetts Institute of Technology to win the NASA/Florida In-Situ Resource Utilization (ISRU) university design competition. The MIT team beat out other FSRI finalists from the Colorado School of Mines, Florida Institute of Technology, and Purdue University.

**ZERO-G Pathfinder Flight Carries FSRI Experiment and Teachers**  
November 2005 — FSRI will fly a bone demineralization experiment and three North Florida teachers aboard the first commercial mission from the Space Shuttle Landing Facility at KSC. The teachers were selected from a pool of several hundred participants in FSRI's regional aerospace workforce development program. The flights will demonstrate NASA's capability to support future commercial space operations at the Shuttle runway.

**FSRI & SIFT Sponsor Summer Aerospace Jobs for Teachers**  
June 2005 — Seventeen Florida K-12 teachers have accepted summer jobs under an FSRI-sponsored program aimed at exposing them to the needs of the state's aerospace industry. The teachers will work for seven weeks on projects involving space tourism, launch range operations, aircraft development, airport operations, and aerospace education.

**FSRI and ZERO-G Partner to Support Research**  
December 2005 — The unique commercially available capabilities of ZERO-G Corp.'s G-Force One aircraft can now be bundled with laboratory resources at the Cape Canaveral Spaceport to support researchers from academia, industry and government. Under an agreement signed this week by ZERO-G and FSRI, FSRI will serve as a clearinghouse and technical support provider for research flights aboard G-Force One.

## FSRI in 2005

The Florida Space Research Institute was established in 1999 to expand and diversify the state's involvement in space research and technology development, and to assist in building a skilled workforce for the state's space industry. FSRI's mandate from the state is *"to serve as an industry-driven center for research, leveraging the state's resources in a collaborative effort to support and diversify the space industry."*

Chapter 331.368, Florida Statutes, directs FSRI, through its industry-majority board of directors, to engage in a variety of programs aimed at moving Florida beyond its launch industry roots. FSRI is working closely with industry, the state's public and private universities, and NASA Kennedy Space Center to build R&D programs that will make Florida a player in higher-value sectors of the space industry.

Some highlights of FSRI's activities in 2005 include:

- Management of the state's Space Life Sciences Lab, including partnerships with multiple universities and over \$2 million in new funding to build Florida expertise in research that will be necessary for long-duration space missions.
- Expansion of the Florida/NASA Matching Grant Program, combining state and federal funding for seed grants to university/industry/NASA research teams on projects that are consistent with Florida's diversification goals.
- Winning competitive federal and state grants to expand a regional aerospace workforce/education program, helping teachers to use aerospace to improve math and science education and excite students about careers in Florida's space industry.
- Building a new partnership with ZERO-G Corp. to provide a unique research capability in Florida while supporting the development of a space tourism industry in the state. (FSRI and ZERO-G will also support education missions and film & television production activities aboard their *G-Force One* aircraft.

### FSRI Board of Directors

Winston "Bud" Gardner (Chair)  
TLC Engineering

Kevin Brown  
Booz Allen Hamilton

Jennifer Carroll (ex-officio)  
Florida House of Representatives

Shelly Cooper  
United Space Alliance

Mike Fasano (ex-officio)  
Florida Senate

Thomas Gamble  
FDOE Division of Community Colleges  
Brevard Community College

Chris Hart (core board member)  
Enterprise Florida

Penny Haskins (core board member)  
Florida Aviation Aerospace Alliance

Jim Kennedy (ex-officio)  
NASA Kennedy Space Center

Frank Krens  
L-3 Coleman Aerospace

Adrian Laffitte  
Lockheed Martin Corp.

Larry Lemanski  
State University System of Florida  
Florida Atlantic University

Bruce Melnick  
The Boeing Company

Jerry Moyer (Vice Chair)  
Bionetics Corp.

Terry Oswalt  
Independent Colleges & Universities  
Florida Institute of Technology

Randy Parsley  
Pratt & Whitney Space Propulsion

Winston Scott (core board member)  
Florida Space Authority



## **Research & Technology Development**

The new Vision for Space Exploration is causing profound changes within our nation's space industry, including a major re-focusing of NASA's programs and budget, and significant threats and opportunities for Florida. While NASA cuts budgets and programs not directly tied to near-term lunar exploration missions, FSRI remains focused on opportunities to diversify Florida's role in exploration-oriented R&D, including life sciences research that will be needed for long-duration trips to the Moon and Mars.

The state's Space Life Sciences (SLS) Lab is ideally positioned to support this kind of research, especially in areas like astrobiology, biomedical space science (radiation effects, bone demineralization and muscle atrophy), and bio-regenerative life support. As co-manager of the SLS Lab, FSRI has established a state-of-the-art space bio-imaging lab within the facility; is sponsoring multiple university research partnerships; and has secured a \$1.3 million NASA grant for 2006 to support exploration-oriented research within the facility.

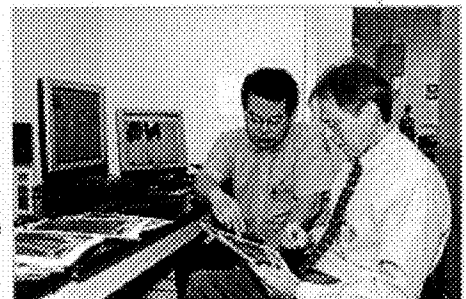


Researchers in the SLS Lab are developing technologies for a Mars Greenhouse that would support a future base on the planet

FSRI is actively pursuing multiple other federal research grants for work within the SLS Lab, from agencies like NIH, DARPA, and environmental organizations. One such grant would fund development of an innovative *hand-held* atomic-force microscope. Capable of imaging samples at the molecular level, this miniature microscope would be used by astronauts, soldiers, and security officials outside of typical laboratory conditions. The project has already caught the interest of DARPA, may be flown in 2006 to the International Space Station, and may also be eligible for Homeland Security funding.

Outside of the SLS Lab, FSRI is involved in the following R&D projects:

- FSRI and NASA have partnered on a MoonROx lunar oxygen production competition. NASA will provide \$250,000 to the first team able to extract a pre-set amount of oxygen from simulated lunar regolith. FSRI will manage the competition, which is expected to begin in 2006.
- FSRI's work on the SHORE hyperspectral remote sensing instrument continued in 2005 with full-time support from a NASA researcher and multiple interns and graduate students. This instrument is being designed for use on the International Space Station or a free-flying satellite and will be uniquely capable of monitoring various coastal conditions in Florida and worldwide.



FSRI Executive Director Sam Durrance works with Dr. Shaohua Xu in the SLS Lab

- Consistent with its statutory charter, FSRI continues to pursue federal funding for range technology development, aimed at accelerating upgrades to the Eastern Range and improving the competitiveness of the Cape Canaveral Spaceport.
- FSRI is sponsoring a two-year study of ways to support the spiritual well-being of future space explorers. NASA has assigned a full-time staff position to FSRI to conduct this research, including analyses of how other federal agencies provide similar support to soldiers and workers in isolated or dangerous locations. The military chaplaincy may be a model for NASA's future support to astronauts in space.
- FSRI now serves as a clearinghouse for ZERO-G research missions, providing technical support, manifesting, lab access, and grant funding for Florida experimenters. FSRI flew a bone demineralization experiment from the SLS Lab onboard ZERO-G's *G-Force One* aircraft during one of its first flights from KSC. With FSRI's support, ZERO-G hopes to fly multiple research-only flights from KSC in 2006, including experiments by scientists at KSC and universities throughout the state.
- As a member of the Florida Space Business Development Group, FSRI is supporting ongoing efforts to locate NASA's Crew Exploration Vehicle (CEV) assembly operations in our state. FSRI provides an R&D and policy perspective to the group's planning for CEV recruitment.
- FSRI has been working closely with the Florida Aerospace Finance Corp. to support FAFC's work with NASA on space policy issues, including future concepts for spaceport operations and integration into the FAA's existing support systems for airports.



Artwork: Pat Rawlings  
NASA, the Air Force, FAA, and other organizations have established the Future Interagency Range & Spaceport Technology (FIRST) program to develop advanced range technologies



Big changes are in store for the Cape Canaveral Spaceport, and Florida can have a major role in defining the spaceport's future

**Florida/NASA Matching Grant Program** — FSRI and the NASA-sponsored Florida Space Grant Consortium (FSGC) expanded the Florida/NASA Matching Grant Program in 2005 with the selection of 15 new projects, bringing the cumulative award total to over \$2.4 million for 129 projects since the FSRI/FSGC partnership began in 2000.

Under this highly successful program, FSRI has coordinated a state investment of \$1.089 million to leverage over \$1.36 million in NASA funds. The combined funding has been invested in strategically selected grant projects that are aimed at diversifying our state's space industry and building R&D talent within our universities.

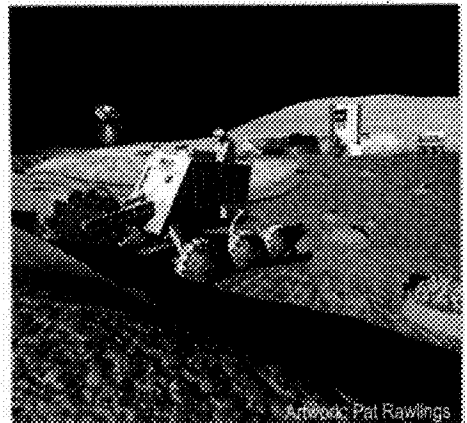
<b>Florida/NASA Matching Grant Program (129 grant awards since 2000)</b>	
<b>Industry and university matching funds generated</b>	<b>\$1,308,726</b>
<b>Industry participants</b>	<b>24</b>
<b>Faculty involved</b>	<b>81</b>
<b>Graduate students involved</b>	<b>53</b>
<b>Total graduate student support</b>	<b>\$429,793</b>
<b>Undergraduate students involved</b>	<b>17</b>
<b>Total undergraduate student support</b>	<b>\$66,574</b>
<b>Follow-on proposals submitted to other agencies</b>	<b>31</b>
<b>Follow-on proposals funded by other agencies</b>	<b>13</b>
<b>Total amount won by follow-on proposals</b>	<b>\$1,656,277</b>
<b>Number of publications</b>	<b>53</b>
<b>Institution grantees: BCC, ERAU, FAMU, FGCU, FIT, FIU, FSU, NSU, UCF, UF, UM, UNF, USF</b>	

Within FSRI's FY-2006/07 budget request is a \$6.5 million Space Technology Diversification Initiative (STDI), intended to significantly expand FSRI's research programs and partnerships with Florida universities, and provide \$1.5 million to expand the Florida/NASA Matching Grant Program. This STDI request is in lieu of a "center of excellence" proposal to the state. Although FSRI's charter is similar to that of a university-based "center of excellence," FSRI is currently ineligible to compete for such funding from the state.

### **Workforce Development & Education**

Workforce issues are consistently included among the top priorities of our state's space industry leaders. According to the Aerospace Industries Association, approximately 27% of aerospace workers will likely retire by 2008, and there are not enough students in the pipeline to replace them.

In fulfillment of its legislative mandate for workforce development, FSRI has established a wide range of programs to support today's aerospace workers and also fill the workforce pipeline with students who can support a more diverse Florida space industry in the future. FSRI's efforts have attracted over \$3 million in federal funding, including multiple federal math & science partnership grants awarded through the Florida Department of Education, and a grant from the U.S Department of Labor.



With FSRI support, KSC has focused much of its attention on the development of spaceport technologies, including R&D on launch/landing bases on the Moon and Mars

The following sections provide a progress update on FSRI's workforce and education programs:

**Aerospace 101** — In partnership with multiple universities (FGCU, UWF and UNF) and industry, FSRI has received four federal Math & Science Partnership (MSP) grants worth more than \$2.7 million, and over \$530,000 from the U.S. Department of Labor and Workforce Florida for this statewide program.

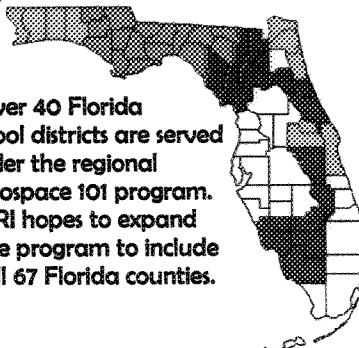
Aerospace 101 establishes a regional network of aerospace education mentors and provides space-oriented professional development for K-12 math and science teachers. The mentors work directly with teachers to conduct workshops and provide space-oriented resources to improve their content knowledge to teach math and science. The program has also sponsored summer aerospace industry jobs for teachers, and rides aboard ZERO-G's *G-Force One* aircraft for outstanding math and science educators.



FSRI flew three North Florida teachers aboard *G-Force One* in November and plans to sponsor more ZERO-G teacher flights in 2006

FSRI hopes to expand Aerospace 101 to support all of Florida's 67 counties and is actively pursuing other grants to do this. Partnerships have been formed with Nova Southeastern University and the University of South Florida to expand into Broward County and the five Tampa Bay region school districts beginning in 2006.

FSRI's MSP programs have been selected to represent Florida in a national study of the impact of federal MSP grants funding.



Over 40 Florida school districts are served under the regional Aerospace 101 program. FSRI hopes to expand the program to include all 67 Florida counties.

**Internships and Apprenticeships** — Internships and apprenticeships are a very effective way to place talented students on a career path in the space industry. FSRI has partnered with NASA to sponsor a *Spaceflight and Lunar Science & Technology Program* (SLSTP) that will provide research-oriented apprenticeships to high-performing college students during the summer of 2006. FSRI will be responsible for recruiting and sponsoring Florida students to participate in this national program.

FSRI also regularly sponsors student interns and graduate students to work on its research programs, and is active in the *Summer Industrial Fellowship for Teachers* (SIFT) program, which places teachers in summer jobs within the aerospace industry. FSRI sponsored 16 such summer jobs for technology teachers in 2005 in Central, Northwest, and Northeast Florida, and will sponsor more in 2006.

**Advanced Learning Environment** — Originally funded by Workforce Florida and NASA, the ALE began as a web-based portal specifically designed to support incumbent workers in the aerospace industry. The system has since evolved into a powerful statewide asset for high-impact education and training.

With a variety of external funding sources, the ALE is currently being used to support a broad spectrum of Florida's critical education and training needs, including:

- Aerospace workforce training and education
- K-12 teacher preparation and recruitment
- Biotechnology workforce training and education
- STEM (Science, Technology, Engineering, & Math) education for K-12 schools and home schools

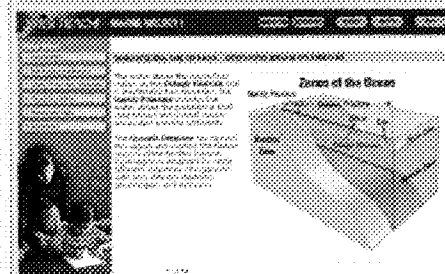
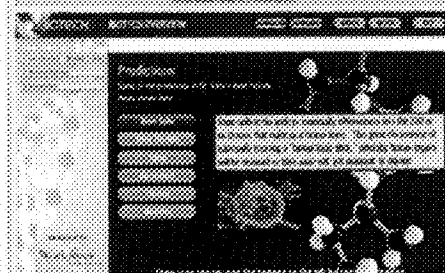
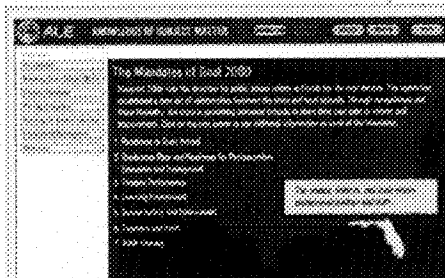
The ALE currently has over 2,000 registered accounts and is being used by school districts, educational consortia, colleges/universities, and industry to meet specific training and education requirements. It is also integrated into FSRI's Aerospace 101 initiative, with grant funds paying for free statewide access to ALE. Creative partnerships with groups such as the Civil Air Patrol and the Troops-to-Teachers program are expanding the ALE's reach and impact.

The ALE's new biotech training modules will be unveiled in 2006 under a partnership with Workforce Florida and iCoast in South Florida.

## Administration & Budget

FSRI is guided by a 19-member, industry-majority board that also includes representation from academia, Enterprise Florida, the Florida Aviation Aerospace Alliance, the Florida Space Authority, the Florida Senate and House, and NASA Kennedy Space Center. Additional oversight is provided by the Office of Tourism, Trade & Economic Development (OTTED).

**Administration Functions** — FSRI's administrative functions include internal accounting and payroll systems under the framework of Board-approved Policies & Procedures. Annual independent audits have consistently found FSRI to be in compliance with federal and state standards.



ALE currently includes over 150 hours of high-quality, interactive web-based content and is available free of charge to Florida industry, teachers, and K-20 students

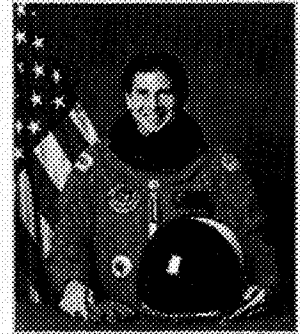


Science and math teachers participate in an FSRI-sponsored workshop to improve their aerospace content knowledge



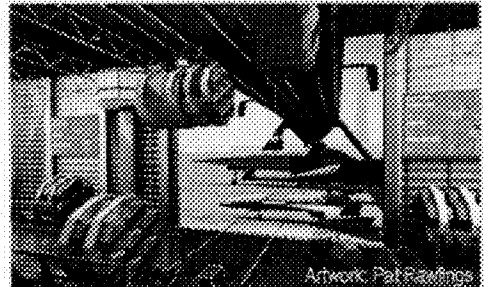
**Staff & Offices** — Dr. Sam Durrance, a native Floridian, is the executive director of FSRI. As a world-class scientist and former astronaut, he brings extensive experience in space research and operations to FSRI.

Dr. Durrance is supported by a small team of talented professionals, with extensive project management, business development, finance, and proposal writing experience. This team was selected with the skills necessary to establish programs with university researchers and industry partners in projects that are beneficial to both communities.



FSRI's offices are located at Kennedy Space Center in the Center for Space Education. FSRI also has a permanent research and administrative presence in the SLS Lab, and employs one Tallahassee resident with a home-based office.

**Accountability** — The Florida Legislature established *Performance Measures and Standards* to insure that entities funded by the State of Florida are held accountable for achieving their intended purpose. For FY-2005, FSRI was assigned a goal of developing 30 research-oriented partnerships and grant projects. FSRI reported a total of 35 partnerships against that goal.



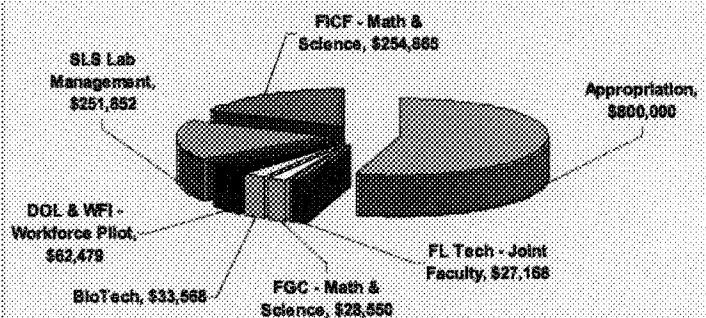
One FSRI goal is to leverage NASA's investments in spaceport technologies to improve the competitiveness and future capabilities of the Cape Canaveral Spaceport.

**Funding Sources** — FSRI is funded by the State of Florida, federal agencies, and by industry. Since FY-2001, FSRI basic operations have been sustained by annual appropriations of between \$600,000 and \$800,000 from the Florida Legislature. These appropriated funds are provided to FSRI through a pass-through contract with the Florida Space Authority.

FSRI aggressively pursues external grants and contracts and typically doubles its allocation of legislatively appropriated funds. The chart shows FSRI's FY-2005 revenue sources.

**Expenditures** — FSRI invests in its people. FSRI's small cadre of employees (including Masters and Ph.D. candidates) is augmented by contractors and temporary and part-time employees, typically graduate and undergraduate students. FSRI had as many as 20 employees during peak FY-2005 activities (including full-time NASA employees assigned to FSRI). The result is an advantageous cost/benefit ratio and competitive overhead rates similar to a commercial service company.

### FY-2005 Revenues by Source (\$1.46M Total)



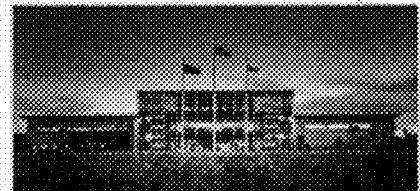
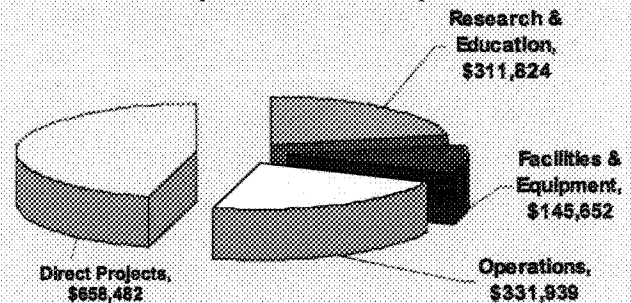
Through attention to cost-cutting, FSRI operated below its anticipated FY-2005 *Operations and Facilities* budgets, allowing an increased investment in FY-2005 *Research & Education* spending. The chart summarizes FSRI's expenditures for FY-2005.

### **Recommendations for 2006 & Beyond**

Given FSRI's interests in space policy, Chapter 331.368, F.S., requires the institute to submit annual recommendations regarding actions the state should take to enhance the development of space-related businesses in Florida, including: R&D activities; capital and technology assistance to new and expanding industries; removal of regulatory impediments; establishment of business development incentives; and initiation of education and training programs for workforce development. The following recommendations are offered:

- Florida should fund FSRI's Space Technology Diversification Initiative.
- Florida should increase funding for the Florida/NASA Matching Grant Program.
- Florida should strongly encourage upgrades and alternatives to current technologies for the Eastern Range.
- Florida should lead federal efforts to empower a spaceport authority to manage infrastructure and improve competitiveness at the Cape Canaveral Spaceport.
- Florida should transfer control of the Space Life Sciences Lab to FSRI to increase commercial and university access and allow reinvestment of lease revenues for R&D.
- Florida should establish an investment fund, using sales tax revenues from the KSC Visitor Complex, to leverage financing for space business growth.
- Florida should aggressively pursue non-traditional space business, including R&D programs, assembly operations for the Crew Exploration Vehicle (CEV), and manufacturing operations for the SpaceX Falcon rocket.
- Florida should establish one or more space-focused "centers of excellence" to sponsor multi-university partnerships with industry, NASA and DOD.
- Florida should provide funding to expand the Advanced Learning Environment and continue free access for Florida users.
- Florida should strengthen its focus on math and science education, much like reading has been emphasized for the past several years.

### **FY-2005 Expenditures (\$1.45M Total)**



#### **FSRI's Plan for the SLS Lab**

NASA's investment in life sciences at KSC has been scaled back from \$17.5 million to just \$6 million for FY-2006. The \$6 million is intended only to preserve the basic capabilities within the SLS Lab.

While maintaining NASA's leased access to the facility, FSRI wants to increase access for university and industry users, and reinvest the majority of NASA's lease payments to support continued life sciences research.

An FSRI proposal for shifting the state's SLS Lab management/operations approach has been submitted to NASA and the Governor's Office.



# **Florida Space Authority**

**Spaceport & Technology  
Committee Meeting**

**January 10, 2006**

*Advancing the State of Space*

# Education/Workforce Development Programs

- FÁS Programs
- Florida Space Academy
- High School / High Tech
- Opportunities in Aviation & Space
- Education Outreach
- Other Programs
- Student Launch Program / Pioneer Cup



# FSA / FÁS Educational Programs

- **Science Challenge**
  - Science undergrads 6-week program
- **Technicians Program**
  - 3-month educational / work program for Techs
- **Jr. Science Challenge**
  - 15 Junior High students for 5 days
- **Intern**
  - 6-month college student program
  - Partners – KSC & FL Tech





# Florida Programs

- **Florida Space Academy**
  - Encourages Florida students toward space-related careers
  - First established June 2005
  - 14 undergraduate students completed Oct-Dec '05
  - 20 statewide undergraduate students May '06
  - Four week-long high school academies, 20 students each June '06
- **Florida High School / High Tech**
  - Promotes science, math and technology careers for students with disabilities
  - FSA involvement since 2004
  - Monthly site visits with 30 students each

# Florida Programs (con't.)

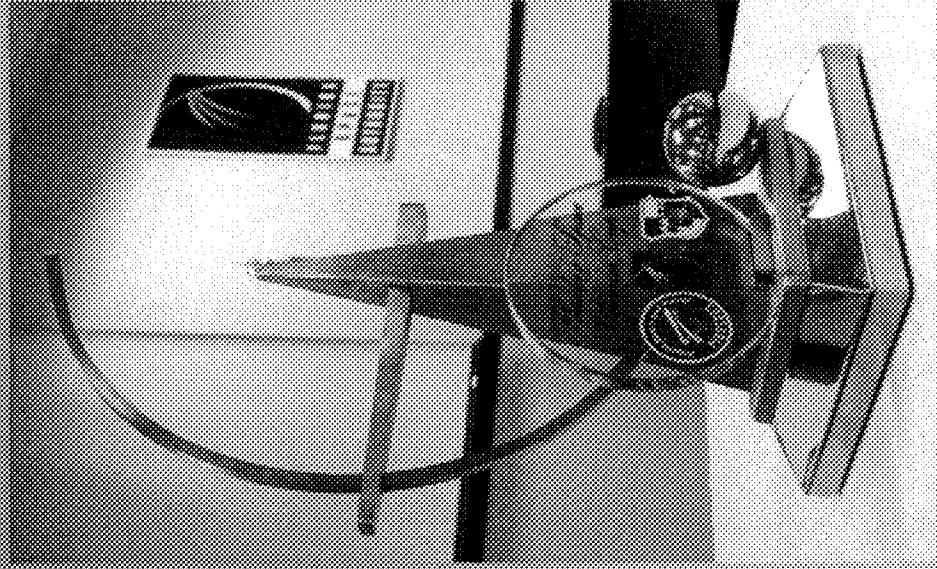
- **Opportunities in Aviation & Space**
  - Established in Nov '05
  - 50 high school students from Titusville
  - FSA / Space Foundation sponsored event at TICO / KSC
- **Education Outreach**
  - FSA involvement since Aug '03
  - Brings space experience into Florida classrooms
- **Other Programs**
  - SpaceTEC – BCC certified technician education program
  - Teach Space Program – Embry-Riddle bringing space exploration into the classroom
  - Yes Teach! Math & Science – FDOE and FL Independent College Fund to bring math & science degree holders into the classroom

# Expanding Programs

<u>Students Served</u>	<u>Jan '05 – Dec '05</u>	<u>Anticipated Students</u>	<u>Jan '06-Dec '06</u>
Florida Space Academy	29	Florida Space Academy	195
HS/HT	250	HS/HT	270
Opportunities in Aviation & Space	50	Opportunities in Aviation & Space	50
Science Challenge	18	Science Challenge	18
Technicians	14	Technicians	20
Interns	9	Interns	12
Education Outreach	600	Outreach	600 Approx.
Other Programs	Growing		
<b>Total</b>	<b>970</b>	<b>Total Approx.</b>	<b>1165</b>



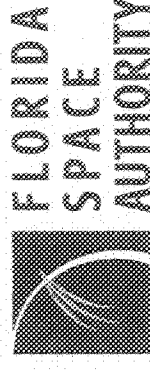
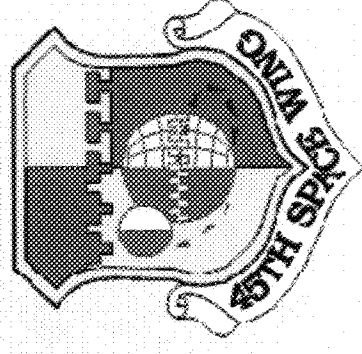
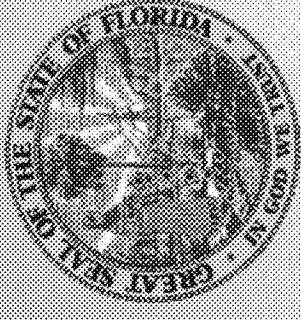
# Pioneer Cup 2006



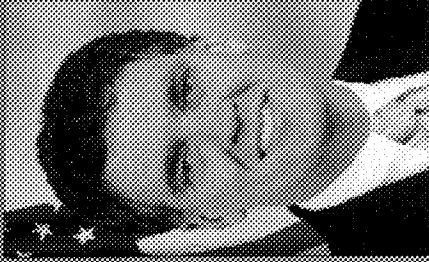
- Rocket design, build, and launch competition
- Criteria
  - Project presentation
  - Scientific experiment
  - Altitude reached
  - Launch processing and safety
- Scheduled launch early summer '06

# Funding Breakdown

- Program Development Costs - \$20,000
- Rocket Motor Test Stand - \$65,000
- Six Degrees Of Freedom Computer Simulation Modeling Program - \$30,000
- Matching Funds for Collegiate/High School/Middle School Students - \$20,000
- Launch Equipment - \$45,000
- Eastern Range Costs - \$20,000
- Total - \$200,000







- “I admire your ability to bring the resources of the Space Coast together for this innovative learning experience,...I would like to encourage you and the Space Authority to consider expanding this operation...I believe there is a real marketing opportunity here.”
  - Congressman Dave Weldon (letter to FSA, dated August 24, 2005)

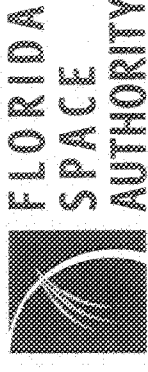


- “I strongly support such efforts to inspire and educate students to pursue careers in science, technology, engineering, and math fields. I firmly believe these types of innovative programs are essential to our efforts to increase the number of qualified employees supporting our space program in the twenty-first century and beyond.”
  - KSC Director, Mr. James Kennedy (KSC letter to U.S. Department of Labor referencing the Science Challenge Program, dated September 14, 2004)



- “Investment follows talent.”

- Founder and CEO of SpaceX Elon Musk (1<sup>st</sup> Space Commission meeting, July 13, 2005)





# **Florida Space Authority**

*Advancing the State of Space*

# FSU Aerospace Projects

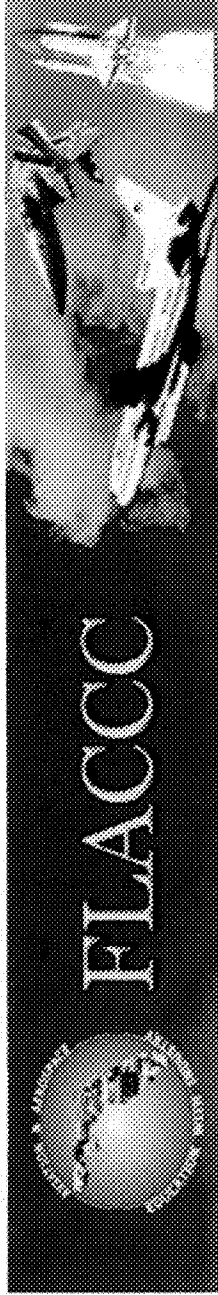
Mr. Tommy Bowermeister  
Institute of Science and Public Affairs

[Tbowermeister@admin.fsu.edu](mailto:Tbowermeister@admin.fsu.edu)

(850) 645-5698 W / (850) 528-0388 C

# Previous Studies

- 1998 AV / AERO Industry Survey – Educ Issues published by The Kitchens Group
  - NASA contract with FAAA / UCF / KSC / EFI
  - 81 aviation / aerospace execs interviewed
- The 2003 Cornerstone Report
  - Florida Chamber of Commerce
  - Looks at State Education Successes / Challenges
- Industrial College of Armed Forces Studies
  - Studies and Reports Worldwide Educ / Ind Status



## Florida Aviation/Aerospace Career Clusters Consortia

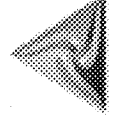
*my* Florida Education  
Department of



**EMERY-RIDDLE**  
AERONAUTICAL UNIVERSITY

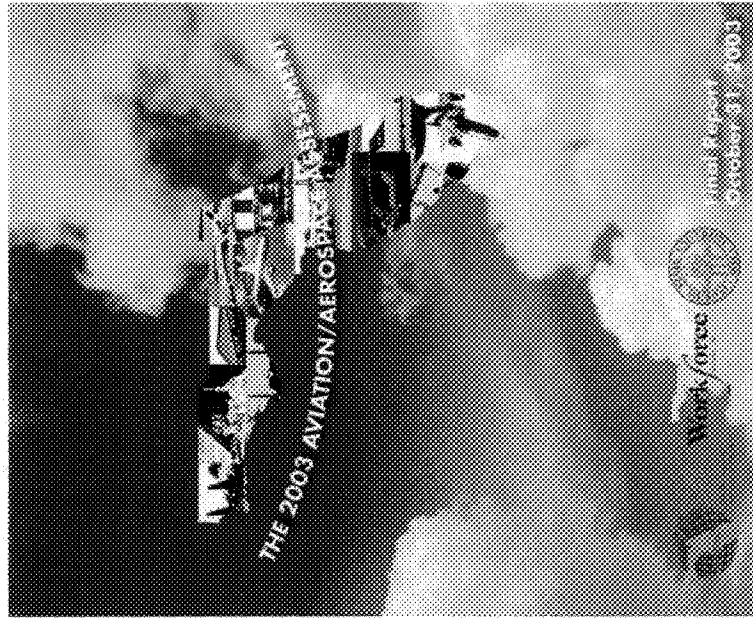
**BREVARD**  
COMMUNITY COLLEGE

FLORIDA COMMUNITY COLLEGE DISTRICT



[www.capitalaerionics.com](http://www.capitalaerionics.com)

**MDCPS - George T. Baker Aviation School**  
**DCPS - Frank Peterson Academics of Tech**





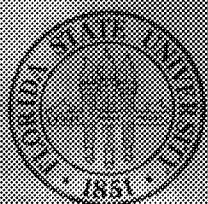
# FLACCC Report

- Eight Sections with Recommendations
  - Section One Overviewed Educ and Industry
  - Section Two covered Curriculum Frameworks
  - Section Three covered Seamless Transitions
  - Section Four covered Electronic Education
  - Section Five covered Awareness Programs
  - Section Six covered Marketing Efforts
  - Section Seven covered FLDOE Changes
  - Section Eight covered Career Information

# FLACCC Recommendations

- Industry must partner with Educators to maintain Intended Outcomes and Student Performance Standards
- In secondary and post-secondary schools, workforce / workplace skills are as important as math and science skills
- Secondary education programs should add courses that are seamless transitions to technical / post-secondary education
- More high school graduates should finish 12<sup>th</sup> grade with a diploma, a certificate / license and a Gold Seal
- FLDOE should create a separate division to maintain the EFI strategic sector curriculum frameworks – not 140 as now
- More awareness activities for teachers / students / counselors and Distance Learning programs

# THE 2004 REPORT TO THE SAFE COUNCIL



Florida Aviation  
Aerospace Alliance

**Final Report**  
**June 30, 2004**

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## Introduction

The Office of Studies and Analysis (OSA) is a part of Florida State University's Institute of Science and Public Affairs. Some prior studies of this office include the 2003 *Aviation/Aerospace Assessment* and the *Florida Aviation/Aerospace Career Cluster Consortium (FLACCC) report*. The 2003 *Assessment* examined the aviation and aerospace industry as a result of the events of September 11, 2001 and the Columbia space shuttle accident of February 2003. The FLACCC report was prepared for the Florida Department of Education (DOE) and was designed to ensure that Florida's students could have an aviation-related career without academic interruption. Specifically, the study established that a middle school student could pursue an aviation career and exit the educational system with either a certificate or a terminal degree. The data from this study forms the basis for this report for the Secure Airports for Florida's Economy (SAFE) Council.

The SAFE Council was established in July 2003 by HB1833, the Secure Airports for Florida's Economy Act. This Council was established to ensure fully coordinated airport and aviation security activities within the state (Tab 1).

"The Council's mission is to identify and recommend new funding sources for airport transportation improvement projects, which enhance the overall security of Florida's transportation system to the benefit of the state's future economic expansion. It is also charged with ensuring the quality of air transportation security in Florida through growth of its management systems and aviation related training capabilities, and to enhance training opportunities for minorities and secondary school students in the industry." The House of Representatives staff analysis of HB1833 "...directs the Council to develop programs for the training of minorities and secondary school students interested in aviation careers." Additionally, the analysis "directs the SAFE Council to review existing programs in Florida and other states when developing programs for the training of minorities and secondary school students interested in aviation careers."

This report will do the following:

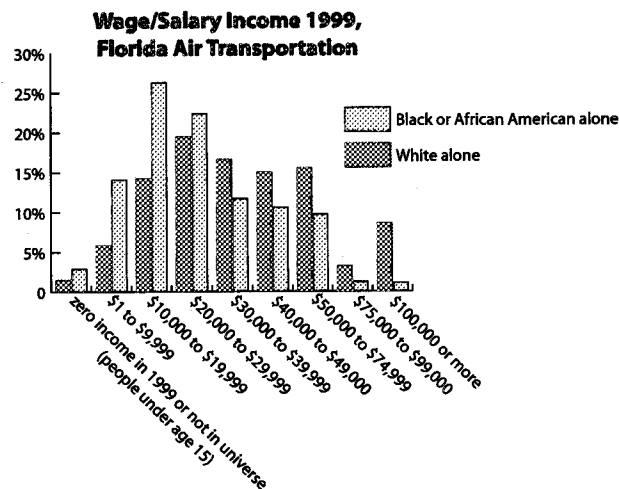
1. Report of programs for minority students in Florida.
2. Report on programs in other states.
3. Cite examples of programs recommended for consideration by the SAFE Council.

## Background:

African-Americans are under-represented in Florida as a percentage of the aviation workforce. African-Americans are currently 12.5% of the total Florida workforce but only 10.1% of the air transportation

segment. The white population is 79.9% of all Florida jobs and 81.8% of the air transportation workforce (Bureau of the Census, 2000 Census). Whites are over-represented in air transportation as a percentage of the Florida population. Additionally, African-American earnings are clustered at the lower ends of the salary distribution as shown on Fig 1.

Figure 1



## Methodology

As stated above the majority of the research for this project was done in conjunction with the FLACCC report. As part of a question and/or conducting an interview the question was always asked if the answer would be different if the question were solely concerned with race. Comments on race and ethnicity are highlighted below in the interview/observation section. The interviews conducted in this section were specifically intended to study predominantly minority schools to ascertain if their problems were different from those at the schools of the consortium.

The FLACCC consortium was comprised of the following individuals representing their individual schools and businesses:

Boeing Company: Dale Simms  
Brevard Community College: Dr. Al Koller  
Capital Avionics: Al Ingle  
Duval County Public Schools: Louis Simmons  
Embry-Riddle Aeronautical University: Dr. Ken Stackpoole and John Faust  
Florida Aviation Aerospace Alliance: Marshall Heard  
Florida Community College at Jacksonville: J.B. Renninger and Rich Rozanski  
Florida International University: Dr. Cesar Levy  
Frank H. Peterson Academies of Technology: Victor Morris  
George T. Baker Aviation School: Ruby Jones  
The Florida Space Research Institute: Tom Cavanagh  
The Florida State University: Tommy Bowermeister, Tom McGurk, Dr. Mae Waters, and Judy Barrett-Elmer.



## Interviews/Observation Specific to Minority Students

Miami Dade Community College (MDCC)  
Ms. Marjan Mazza, Director, MDCC Aviation Program

The MDCC is the only two-year program leading to air traffic controller (ATC) certification. MDCC is a minority school populated primarily by Hispanic students. The ATC is a very popular program due to the high salary commanded by certified ATC employees.

Commercial Flight Crews. When between flights or changing flights the authors frequently approached flight crews and interviewed them informally. The objective was to determine how they became involved in their aviation career. Exposure was the main response, either through the military or a family connection. The observation was made that despite the fact that a Bachelor's degree is not officially a requirement for some airlines, it is a definite discriminator when hiring decisions are made.

Organization of Black Airline Pilots (OBAP): The writer attended a meeting of the OBAP national board of directors in Dallas, Texas on April 24, 2004. Discussions centered on reasons for the lack of minorities in aviation. Consensus settled on a lack of motivation at an early age.

The OBAP focuses on preparing young minority individuals for successful career in the aviation field. It endeavors to spread the message that aviation is not an exclusive field for "white people." The OBAP programs are as follows:

- Career enrichment program: Providing specific subject matter from a skilled/knowledgeable individual member
- Serving on advisory and certification boards
- Professional Pilot Development Program
- Mentorship program
- Job placement program
- Fellowship program
- Scholarship program
- Pilots in the school: Pilots giving presentations at middle and high schools
- ACE: The Aviation Career Education camps.

The ACE camps are sponsored by OBAP with partners such as the Federal Aviation Administration (FAA), NASA and Delta Airlines (Tab 2). The purpose of the camps is to expose young minority students to aviation through visits to museums, airports, military bases, and at least one actual flight. OBAP has 17 scheduled ACE camps nationwide scheduled for the summer of 2004.

Engineering, Management and Technology, Inc. (EMT)

Terry Troutman, Captain, United States Air Force

Captain Troutman is an African-American Air Force Reserve pilot, who currently pilots C-17 transport aircraft from Charleston Air Force Base, South Carolina. Captain Troutman is employed by Engineering, Management and Technology, Inc. (EMT), and is on contract to recruit minority students for entry to the USAF Reserve Officer Training Program (ROTC). As of April 2003, the United States Air Force had 12,744 active duty male pilots and of that number, 258 or 2% were African-American. There were 472 female pilots and only 4 or 0.8% are African-American. Captain Troutman travels the Southeast region speaking to schools on the advantages of the ROTC program. ROTC scholarships pay the complete cost of an undergraduate education and include a monthly stipend. Captain Troutman's efforts are aimed at the middle school student. His observation is that by high school the student has made up his/her mind and is not open to consideration of a career in aviation. It is also his observation that the African-American family actively discourages careers in the military. This discouragement is a vestige of the segregated services that existed prior to the 1947 decision by President Truman to integrate all the military services. Another factor of major consequence in inhibiting African-American students from entering military aviation careers is the 10 year active duty service commitment required for pilots (Tab 3).

HiTek Learning Systems, Inc.

Mr. Jim Reed

HiTek is an aviation-based program which emphasizes developing math and reading skills and workforce development. This program is presented around the nation, usually on summer schedules and generally through local workforce boards. It may be presented through schools for remediation of at-risk youth or for development of workplace readiness skills (sometimes referred to as "soft skills"). The program uses aviation as its foundation and includes flight ground instruction and one flight. This program has documented grade level improvements and is recommended by the authors of this paper (Tab 4). Contact data is as follows: James Reed, HiTek Learning Systems, Inc., 223 S. Commerce Avenue, P.O. Box 1599, Sebring, FL 33871 or [www.hitek.org](http://www.hitek.org).

University of Florida (UF)

Dr. Jonathan Earle, Associate Dean, College of Engineering

Discussion with Dr. Earle centered on aviation careers

1. Unfamiliarity with the engineering field. In other words, students have not been exposed to engineering (and other sciences) at the middle school level where it is believed the career direction is set for many youngsters.
2. Minority students, in Dr. Earle's view, also are the victims of a culture of low expectations and therefore are not challenged sufficiently to prepare for career fields where significant rigor is required.

Four innovative camps (in addition to the ACE camps) are recommended for further study and possible adoption by various agencies or community groups (Tab 6). Additionally, a proposal for an after-school program aimed specifically at Haitian-American youngsters is included (Tab 7). This program is not currently in operation in the Miami area due to community college jurisdictional issues; however, it is under consideration by Florida Memorial College. An after-school program for at-risk youngsters, has great merit and should be considered for other areas in Florida.

- **NASA/SEMMA Summer Camp.** This is a NASA program. SEMMA is the Science, Engineering, Mathematics, and Aerospace Academy conducted at 21 inner city sites throughout the Miami area. The first week of camp had 979 students enrolled. The camps endeavor to create awareness of the aerospace industry from a very wide perspective, not just aviation-related jobs. The program also uses "parent coordinators" to educate the parents on the potential for the career field. Additionally, the program is taught year round at selected locations throughout the nation.
- **Kids in College—Summer Learning Opportunities.** This is an innovative program of the Daytona Beach Community College designed to acquaint youth with the college environment in addition to coursework in geography, art, cooking, computers, foreign languages, writing and more. This concept should be expanded to inner-city areas throughout the State and include aviation related subjects.

During March, April, and May 2004, several aviation and aerospace interviews were conducted across Florida. Each interview consisted of questions about specific industry knowledge and skill requirements as well as minimum education levels required for first-time employees. Since most aviation and aerospace jobs require a federal license or certificate, post-secondary educational degrees are not mandatory; however, since 9/11/01, the supply of available employees has outweighed requirements, and educational degrees greatly benefit those trying to enter these career fields. Another important aspect to consider about the aviation and aerospace industries is the fact that a highly trained, experienced, and desired workforce is available as personnel leave the military forces. Almost all of these individuals possess training on the most advanced equipment with at least an Associate's degree and many with Bachelor's degrees.

**Aviation Maintenance.** This area includes individuals who have received education and training in the Aviation Airframe and/or Aviation Powerplant frameworks, the Avionics framework, and the Aviation Maintenance Management frameworks. Interviews were conducted at businesses as large as a major Maintenance, Repair, and Overhaul facility for multiple major airline carriers which employs over 1000 people and as small as a business with 10 employees repairing aircraft avionics components. Since the aviation maintenance career field is heavily



Academy. The Nida Corporation and Delta Connection Aviation Academy are commercial training programs that teach only practical applications--Nida teaches Avionics and Delta teaches Professional Pilots. Both Nida and Delta use block-classes in which a group of students goes through the entire training program as a group; both organizations believe this is the preferred method to help students build rapport among them, enabling them to finish the program. A new concept used by Nida is to apply an "open entry-open exit" philosophy through which a student can start and accelerate through a program as long as the required competencies are acquired (not contact time based); the course starts with theory, then experimentation, followed by practical applications, and finally examination. Another method that Nida uses to teach avionics is to teach hands-on applications first, then give the certification test, and finally complete the classroom and textbook knowledge requirement.

Airline Pilot industry. Interviews were accomplished with pilots from several different airlines and freight carriers. As a result of the 9/11/01 impact on the major airline industry, an abundance of airline transport pilots has increased the minimum education level criteria to the Bachelor's Degree. The type of educational degree does not matter since the FAA regulates pilot abilities through oral, written, and practical flying examinations. Also, by the time a pilot has enough flight hours to qualify as an airline transport pilot, the time lapse since the educational degree was acquired could be as much as ten years. The Associate's Degree is the minimum education required for regional jet pilots since the flying hour requirements are much lower than those for airline transport pilots and the demand for regional jet pilots was not affected as significantly as the larger airlines after 9/11/01. In fact, one interviewee stated that the corporate aviation business is "booming."

Department of Defense. The military educates and trains its members to be aviation and aerospace mechanics, air traffic controllers, airport and spaceport managers, as well as pilots and astronauts. The education is centralized; students are put in block-classes and generally start with the same students with whom they graduate. Once a basic education is obtained, each military member is sent to specific education locations where, again, students are put in block-classes and normally graduate together. Once fully educated, these personnel are provided on-the-job initial and continuing training. Most are given the opportunity for additional civilian education and professional military education as they reach appropriate experience levels.

## Discussion

A 2003 study by the Industrial College of the Armed Forces (ICAF) on education in America "...revealed that the United States abounds with imaginative program

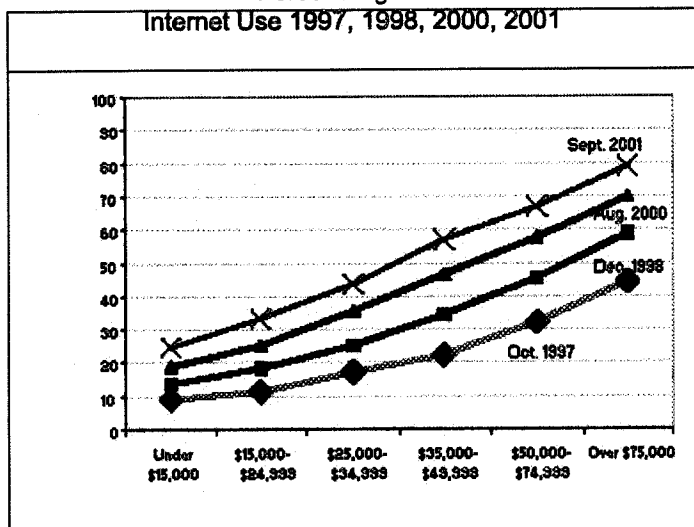
opportunities for education and training." Sadly though, access is uneven and too often is associated with the distribution of wealth in this nation. Poverty is the issue, and the same report goes on to state that student performance is a direct negative link to poverty (Industrial College of the Armed Forces, Education 2003, p 1-5). The ICAF report also relates that 68% of fourth grade students who cannot read on grade level are minority students living in poverty. The US Census bureau reports that for 2002, 8% of white families lived at or below the poverty line while 24.1% of black families lived at or below the poverty level. Living in poverty (frequently in inner cities) inhibits a young person's perspectives, i.e. there is less exposure to career fields that are high wage earning careers such as aviation. It seems reasonable that those students struggling with reading are unlikely to be attracted to the highly rigorous academic fields. Additionally awareness of aviation-related career possibilities is not likely to be present. Anecdotal data shows a high correlation between minority aviation career interest and family background. Virtually all African-American aviators had a strong link either through some family member or some close friend.

Almost everyone interviewed for this effort mentioned lack of awareness or lack of exposure to the aviation career field. The recommendations that follow for camps are very important to remove the person from the environment for the sole purpose of letting him or her know that there is a different world beyond the city streets.

There are literally thousands of web sites that are devoted to education and aviation, education specifically. The National Air and Space Museum has a site entitled "Black Wings" which tells the story of the Tuskegee airmen (Tab 8). Additionally this site contains an educational links page containing 79 links to educational programs aimed primarily at the K-12 student (Tab 9). Frequently these sites are broken down to grade level materials, making them easier for the student to use.

The Discovery Channel sponsors a web site, [discoveryschool.com](http://discoveryschool.com) which is an exhaustive list of subjects, again broken down to grade level, including reference material and definitions (Tab 10). Also from the Discovery Channel is BJ Pinchbeck's *Homework Helper*. This site is divided into areas such as general science, earth science, space medicine, biology and even contains *Gray's Anatomy* (a classic, expensive text) (Tab 11). Finally, the Discovery Channel also provides a lesson plan library, again broken down by grade level (Tab 12). Unfortunately, those families cited above living in poverty are frequently without a computer with internet access and are therefore unable to access these truly valuable resources. Programs should be accelerated that get this powerful tool to those families. Figure 2 shows the gains made by

Figure 2 Internet Use from Any Location by Family Income, Persons Age 3 +  
Internet Use 1997, 1998, 2000, 2001



Florida has a number of outstanding universities, community colleges and aviation high schools throughout the state (Tab 13). However, transportation remains an obstacle to many educational programs. This fact was emphasized in the 2003 *Aviation/Aerospace Assessment*. Taking programs to community centers such as in Miami's NASA/SMEAA program are models that should be expanded Florida-wide. This program should be adapted for on-line and offered on Florida's Virtual Middle and High School. It is worth repeating that internet connected computers should be widely deployed to those economically deprived citizens as rapidly as possible.

## Recommendations

1. Recommend that the Department of Education (DOE) work with community colleges and high schools to develop a basic core curriculum common to any technical subject area in the high technical/high wage sectors. The DOE would then secure articulation agreements with all Florida universities and community colleges to accept the coursework offered in this basic core curriculum toward an Associate in Science or Associate in Arts degree. Harmonization is the terminology used to describe a similar program in Europe. The proposed plan would create a standard curriculum of math, science and basics of workplace readiness skills to meet the requirements of a core curriculum as a prerequisite to any technical subject area whether it is aviation, aerospace, electronics, medical, etc.

This common basic curriculum would enable a student to choose multiple paths of technical areas of study with minimum costs in terms of dollars and time duplicating courses taken when transitioning from one program to another. Ideally, a student changing

his major after entering a technical program of study would not have to "start all over" with any of these basic core requirements. For example, an avionics technician could quickly become competent in similar occupations such as medical equipment maintenance, or a professional pilot student could transition to an air traffic control curriculum.

2. Recommend the DOE negotiate a universal articulation agreement between all Florida universities and community colleges to accept coursework in aviation and aerospace related frameworks. These frameworks would be standardized whether taught at the high school, community college, or university level. This would enable a student to change academic locations throughout Florida without having to retake additional coursework that has already been successfully completed.

3. Recommend the DOE create specific subject matter materials relating to workplace readiness skills. This includes basic material such as workplace behavior, working with teams, dress, integrity and work ethics that include dependability, accountability, and reliability. This is the most noted skill deficiency mentioned by a majority of the business owners interviewed.

4. Recommend a list of aviation and aerospace science fair projects and topics be provided on websites available to middle and high school teachers.

5. Recommend website links like <http://florida.echoices.com> or <http://www.avjobs.com> be included in middle and high school awareness "Flyers" (see Tab 14).

6. Recommend Florida's existing Aerospace Technologies I/II/III courses or the Civil Air Patrol curriculum found at <http://www.allstar.fiu.edu/aero/links.htm> be included on the Florida Virtual High School and Florida Virtual Middle School websites as extra curricular courses.

7. Recommend the Virtual Job Shadow website ([www.jobshadow.org/index.html](http://www.jobshadow.org/index.html)) that provides teachers with information related to various aviation projects be used in science, math, and reading classes. Recommend the DOE or local school boards create an incentive program to encourage teachers to complete the program.

8. Recommended links are available to supplement or enhance any science, math, reading, aviation or aerospace curriculum or provide distance learning coursework for students. (See Tab 15 for a complete listing.)

9. Recommend that the Florida Comprehensive Assessment Test (FCAT) include sample reading, math, and science questions related to aviation and



aerospace.

10. Recommend teacher worksheets that use aviation and aerospace examples for math, reading, and science be provided for teachers to use in elementary, middle and high schools.

11. Recommend FCAT website sample questions provided for parents include aviation related examples.

12. Recommend the DOE solicit the necessary funds to acquire aviation/aerospace related books for school libraries and classrooms. School libraries or media centers and classrooms should be provided with aviation/aerospace-related books for students of all ages and reading levels from elementary school to high school. Providing schools with more aviation/aerospace books will serve as a means of introducing students to aviation/aerospace as well as promoting the students' interest in aerospace or aviation. Just as a child selects sports related books to read, another child may wish to select a book about airplanes.

13. Recommend the DOE provide more aviation-related supplemental reading books for 2nd-4th grade students. One example is the book *Hatchet* by Gary Paulsen. Other resources can be found on the ALLSTAR website at <http://www.allstar.fiu.edu>.

14. Recommend a one-time grant be given by the DOE to a national program based on aviation, which emphasizes developing math, science, and reading skills as well as workforce development. The program should be available year-round and presented in a format compatible with classrooms and local workforce board facilities. The program could be presented in schools for remediation for at-risk youth and for development of work place readiness skills. The program would need documentation that showed grade-level improvements in math and science aptitude scores.

15. Recommend schools, beginning with the middle school grades and upward provide career counseling to all students. Appropriate guidance counseling tools such as brochures, informational CD's or videos related to careers in aviation and aerospace could be produced and made available to all guidance offices. Salary information should also be made available.

16. Recommend high schools locate a "One-Stop" Career Center on the school campus to acquaint students with career opportunities earlier in their education. Some schools may wish to make career informational kiosks available to the students.

17. Recommend junior and senior students in aviation/aerospace programs provide career counseling/mentoring to middle and high school students as credit toward community service requirements for

graduation.

18. Recommend more teachers be invited to attend workshops at aviation/aerospace colleges to increase awareness of aviation aerospace programs. With the increased awareness, teachers may be able to promote student interest through science projects and/or science fairs.

19. Recommend programs such as the Civil Air Patrol Aerospace Education curriculum be used as an elective credit in high schools.

20. Recommend the DOE solicit aviation and aerospace competition programs like the robotics competition held by the For Inspiration and Recognition of Science and Technology (FIRST) organization. For more information on this organization, see the following website: <http://www.usfirst.org/>. FIRST designs accessible, innovative programs to build self-confidence, knowledge and life skills while motivating young people to pursue opportunities in science, technology and engineering.

21. Recommend the DOE and/or Workforce Florida Incorporated (WFI) solicit the various state and national aviation and aerospace professional associations to compile an occupation list by skill and location. Some examples include Organization of Black Airline Pilots, Florida Aviation and Aerospace Alliance, Aircraft Owners and Pilot Association, and American Association of Airport Executives (AAAE). These organizations/associations could survey their membership and provide information for a directory available to schools and youth organizations.

22. Recommend the DOE coordinate with the Kennedy Space Center to create a program similar to the one recently started at the Johnson Space Center in Houston, Texas to help middle school teachers. This unique professional development opportunity gives math and science teachers an opportunity to integrate NASA instructional resources into their own middle school curriculum, emphasizing real-world applications. Eighty middle school teachers attend a one-week summer workshop at Johnson Space Center developing an "action plan" focusing on teaching math and science concepts from a different perspective. Using the space program as a motivator, these educators introduce their students to the role that math and science play in many career opportunities. Along with the summer workshop, this program also provides a series of distance-learning events throughout the following school year. Through the distance-learning program, students may interact with experts in the space program without ever having to leave their schools.

23. Recommend the schools' guidance or career counselors provide at-risk and other students with information regarding the specific programs on aviation and aerospace jobs that do not require a BS or AS degree.

24. Recommend the DOE provide information related to aviation and aerospace programs and aviation camps to the Agency for Workforce Innovation (AWI) and the One Stop Career Centers to promote awareness of career opportunities to at-risk and low-income students.

25. Recommend the DOE and/or school boards contract with aviation summer camps to teach math and science with the use of aviation examples. The DOE should provide scholarships for low-performing students on the FCAT as well as low-income or at-risk students who need remediation in reading, math, or science and test taking skills. The assumption is that these summer camps may encourage students to remain in school and encourage an interest in the pursuit of aviation/aerospace related jobs. The NASA Science, Engineering, Math, and Aerospace Academy (SEMAA) is an example. For more information, visit their website at <http://www.semaa.net/AboutUs/>.

26. Recommend Florida community colleges offer a high school dual-enrollment program in aviation/aerospace coursework like the programs offered by Florida Community College at Jacksonville or George T. Baker Aviation Academy in Miami. In addition to dual enrollment, classes may also be offered as distance learning or night courses.

27. Recommend the DOE provide minority students with specific information about the opportunities and eligibility requirements of aviation and aerospace educational programs and employment. It is suggested that the DOE facilitate an awareness program, with the help of the Association for Women in Aviation Maintenance (AWAM) or the Organization of Black Airline Pilots (OBAP), to reach minority students at the middle and high school levels.

28. Recommend the DOE solicit minority role models in all segments of the industry and produce a video or CD for students' or teachers awareness.

29. Recommend expansion of the "About Face" program. The Florida Air National Guard "About Face!" program provides life skills and drug awareness training, including mentoring assistance to youth between the ages of 13 and 17. The About Face! program is held at local National Guard armories in pre-selected areas throughout the State of Florida. Year round sites are currently operating in Ft. Myers, Ft. Pierce, Jacksonville, Tampa, and Tallahassee. During the summer, 27 total sites will be operational. Since the About Face! program began in 1997, it has served a total of 5,368 participants. Of those, 88.5% (4455) have successfully completed the program and have shown an increase in academic performance. Students participate in an activity-based curriculum designed to focus on functional life skills and the improvement of basic skills. All activities are reality-based, allowing the students to see the relevance of the skills they are

learning. The 10:1 student/instructor ratio allows for a tremendous amount of individual instruction. Students receive both traditional instruction and Computer Assisted Instruction. Drug Awareness Training through the National Guard's anti-drug program along with a strong smoking prevention curriculum gives students the opportunity to discover the dangers of drug and tobacco use. The About Face! program also works to provide mentors from the community to assist students in their work. Recommend the Florida National Guard About Face! program include an aviation/aerospace awareness program.

30. Recommend the DOE solicit sponsors to provide scholarships to low-income students and/or schools to attend Florida air shows.

31. Recommend the DOE solicit sponsors to provide scholarships to low-income students to attend aviation summer camps to promote awareness of aviation and aerospace opportunities.

32. Recommend that DOE develop awareness brochures, CD's and/or videos related to aviation and aerospace educational programs and career paths to include the potential income opportunities, for use by guidance and/or career counselors. The ALLSTAR program is an example of a CD developed by Florida International University.

33. Recommend the DOE provide aviation and aerospace articles for a weekly reader or newspaper to both middle and high school students (initially target middle and high schools that offer the Aerospace Technologies I/II/III programs).

34. Recommend both the DOE and local school boards provide each school library and/or media center and each public library with an aviation and aerospace informational kiosk. The kiosk would be equipped with information related to aviation and aerospace educational programs and career paths.

35. Recommend the DOE and/or the Department of Transportation create videos/CDs/DVDs to promote all HI Wage/HI Tech jobs around airports.

36. Recommend the DOE provide funds to community colleges and/or vocational schools to market and promote awareness of their aviation and aerospace dual enrollment programs.

37. Recommend targeted industry sectors and schools become partners to make teachers more aware of industry opportunities. The Johnson Space Center program located in Houston, Texas is an example of industry partners providing professional development for middle school math and science teachers. This one-week program helps educators enhance their existing curriculums while promoting the aerospace industry to





## **Florida Universities/Colleges/High and Middle Schools with Aerospace/Aviation programs:**

**Embry-Riddle Aeronautical University**     Daytona Beach with seven satellite locations in Florida (Ft Walton Beach, Panama City, Tallahassee, Jacksonville, Orlando, Tampa, and Miami)

### **Master's Degrees**

**Aeronautics**

**Aerospace Engineering MSAE/MAE**

**Business Administration in Aviation MBA/A**

**Space Science**

### **Bachelor's Degrees**

**Aeronautical Science**

**Aeronautical Systems Maintenance**

**Aeronautics**

**Aerospace Engineering-**

**Accelerated five-year program – bachelors and master's degrees.**

**Aerospace Studies**

**Air Traffic Management**

**Applied Meteorology**

**Aviation Management**

**Business Administration in Aviation**

**Everglades University**     Boca Raton and Sarasota Florida

### **Bachelor's Degree**

**Aviation Management**

**Professional Aviation**

**Aviation Technology**

### **Masters Degree**

**Aviation Science**

Graduates of the online degree programs earn the same course credits and degrees as those students who complete equivalent courses and programs on campus. For more information regarding online education please visit the Online Education web site at [www.evergladesuniversity.org](http://www.evergladesuniversity.org)

### **Online Graduate programs:**

- **Master's Degree in Aviation Science**

### **Online Undergraduate programs:**

- **BS Degree - Major: Professional Aviation**
- **BS Degree - Major: Aviation Management**
- **BS Degree - Major: Aviation Technology**

Students enrolled in Everglades University's online degree programs have easy access to the latest online educational delivery methods. Courses are taken on the Internet, from your home, the office or any convenient location at a time that fits your schedule.

The online courses are designed by qualified faculty and staff to create an interesting, interactive learning environment. The virtual classroom is comfortable, and courses can be taken easily by anyone with access to the World Wide Web.

Lesson plans, assignments, and class schedules are posted online, and while student/teacher interaction and student/student interaction also occur over the Internet. Scheduled discussions, email messages, live chats, and group discussions are a few of the opportunities for interacting during your online course.

Florida Institute of Technology , Melbourne Florida

**Doctor of Philosophy Degrees**

- Aerodynamics and Fluid Aerodynamics
- Aerospace Structures and Materials
- Combustion and Propulsion

**Master's Degrees**

- Aerodynamics and Fluid Aerodynamics
- Aerospace Structures and Materials
- Combustion and Propulsion

**Bachelor's Degrees**

- Aeronautical Science
- Aeronautical Science with Flight Training
- Astronomy
- Astrophysics
- Aviation Computer Science
- Aviation Management
- Aviation Management with Flight Training
- Aviation Meteorology
- Aviation Meteorology with Flight Training
- Engineering, Aerospace
- Science Education, Earth/Space Sciences
- Space Sciences

Florida Memorial College, Miami Florida

**Bachelor's Degrees**

- Aeronautical Science
- Airway Science
- Computer Science (Concentration in Aviation)

Lynn University, Boca Raton Florida

**Master's Degree**

- Business Administration- Aviation Management**

**Bachelor's degree**

- Business Administration- Aviation Management (flight and non flight option)**

**Flight Training**

- Professional Pilot Training Program through Aeroservice Facility**

University of Central Florida, Orlando Florida

**Masters Degree**

- Aerospace Engineering
- Space Systems Design and Engineering Track
- Thermofluid Aerodynamic Systems Design and Engineering Track



Bachelor's Degree  
Aerospace Engineering

University of Florida, Gainesville Florida

Bachelor's Degree  
Aerospace Engineering

Combined Bachelor's/Master's Degree (3/2)  
Aerospace Engineering

Doctor of Philosophy Degree  
Aerospace Engineering

University of Miami, Miami Florida

Bachelor's Degree  
Aerospace Engineering

## **Community Colleges offering Aviation and Aerospace Programs**

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Miami-Dade Community College  
Palm Beach Community College

### **Aviation Operations or Administration**

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Miami-Dade Community College  
Palm Beach Community College  
St. Petersburg College

### **Aerospace Technology**

Brevard Community College

### **Professional Pilot Technology**

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Florida Community College at Jacksonville  
Indian River Community College  
Miami-Dade Community College  
Palm Beach Community College

## Recommended linkages for additional aviation/aerospace information

<http://www.X-zylo.com>

X-zyLo is an astonishing flying gyroscope that has fascinated people of all ages and intrigued scientists with its superb flight characteristics.

<http://sats.larc.nasa.gov/precollege.html>

Website to explain Small Aircraft Transportation System and includes school problems and worksheets.

[http://education.nasa.gov/divisions/eleandsec/overview/F\\_pathfinder\\_edu\\_astronaut.html](http://education.nasa.gov/divisions/eleandsec/overview/F_pathfinder_edu_astronaut.html)

NASA's Astronaut Educator Program

<http://www.allstar.fiu.edu/aero/links.htm>

Comprehensive aviation and aerospace website with science, history, and math lessons for middle and high school students.

<http://www.faa.gov/education/index.cfm>

The FAA education website with educational information.

<http://www.faa.gov/education/resource.htm>

FAA information about aviation schools, career information, and federal programs.

<http://quest.arc.nasa.gov/aero/teachers/learning.html>

NASA Quest Aerospace Lesson Plans for K-12

[http://www.nasa.gov/audience/foreducators/F\\_NASA\\_Program\\_Inventory.html](http://www.nasa.gov/audience/foreducators/F_NASA_Program_Inventory.html)

A Guide to all NASA Educational programs.

<http://www.bizworld.org/>

A website for K-6/7 to teach elementary students entrepreneurial skills such as marketing, budgeting, production, and human resources.

<http://www.state.nj.us/njded/frameworks/ccwr/appendixg.pdf>

Ten pages of workforce skills and websites...NJ education site.

<http://www.planemath.com/activities/pmenterprise/index.html>

Learn how to design a plane.

<http://www.planemath.com/activities/pmactivities4.html>

Learn math while learning about aviation.

<http://www.wvonline.com/skyschool/page6.htm>

Great list of aviation websites for students and teachers.

<http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/newton/Stillite.html>

Satellite technology website and experiments.

<http://www.howstuffworks.com/space-shuttle.htm>

Information on the Space Shuttle Program and how spacecraft work.

<http://science.howstuffworks.com/airplane.htm>

Information on how airplanes fly.

<http://nwmwg.cap.gov/santafe/Activities/OtherActivities/ActivityIndex.htm>  
Aerospace education activates for teachers to use in all types of classes

<http://www.dot.state.mn.us/aero/aved/teachers/index.htm>  
Minnesota DOT website with aviation curriculums and professional development information.

<http://www.dot.state.mn.us/aero/aved/pdf/augie.pdf>  
Activity workbook on the first African America Airline pilot.

<http://kids.msfc.nasa.gov/defaultNoFlash.asp>  
NASA Internet resources for K-20 and professional development

<http://www.dtae.org/>  
Georgia virtual technical colleges

<http://www.faa.gov/education/ACEcamp.htm#Eastern%20Region>  
FAA sites that offer aviation centers of excellence (ACE) flying camps

<http://www.gnacademy.org/mason/catalog/browse/topic/Engineering/Aerospace>  
Website with nation-wide distance learning aviation/aerospace courses

## AIRCRAFT FLIGHT

<http://www.kidwings.com/teacher/flight/>  
Simple experiments on Bernoulli's Principle

<http://www.fi.edu/flights/own2/forces.html>  
Numerous pages that describe the science of flight

<http://www.gomilpitas.com/homeschooling/explore/flight.htm>  
A very comprehensive list of flight information and also history, hot air balloons, model planes, etc.

<http://www.workman.com/fliersclub/download.html>

<http://www.workman.com/fliersclub/links.html>  
Some fun with paper airplanes.

<http://www.howstuffworks.com/airplane.htm>  
Another list of flight information.

<http://www.lerc.nasa.gov/WWW/K-12/airplane/airplane.html>  
Parts of the airplane Boeing 767 size

[http://www.grc.nasa.gov/WWW/K-12/BGA/Dan/airplane\\_parts\\_act.htm](http://www.grc.nasa.gov/WWW/K-12/BGA/Dan/airplane_parts_act.htm)  
A test for the parts of the airplane Boeing 767 size.

<http://www.allstar.fiu.edu/aero/fltmidparts.htm>  
Parts of the airplane with videos and experiments.

<http://www.eaa1000.av.org/yeagle/eagle3.htm>  
More on parts from an EAA chapter.

<http://www.faa.gov/education/documents/other/mainpart/>  
Download worksheets for parts and the instrument panel

## AVIATION HISTORY WEB SITES

<http://www.aviation-history.com/>

This has a little bit of everything, including aircraft recognition and a section on the theory of flight.

<http://www.ninety-nines.org/bios.html>

List of articles on women in aviation history

<http://aerofiles.com/>

It has a great chronology list of firsts in aviation. Plus lots of pictures and NO advertising.

<http://www.webring.org/cgi-bin/webring?ring=avihistory:list>

This is very comprehensive list of aviation history sites. Excellent if you don't mind waiting for all the ads to download.

<http://www.airmailpioneers.org/>

A site dedicated to the history of the early airmail pilots.

<http://www.tighar.org/>

This is the group that is looking for Amelia Earhart's Lockheed Electra in the South Pacific. Not a lot of history, just interesting information.

<http://www.braniffinternational.org/>

This is on the web ring listed above. An excellent site that describes the era of the airlines regulation.

<http://www.fas.org/irp/mystery/history.htm#38>

This has interesting information on former SECRET aircraft.

## AIR AND AVIATION MUSEUMS

AirVenture Museum, Oshkosh, WI - <http://museum.eaa.org/>

Aviation & Space Center of the Rockies, Denver, CO - <http://www.wingsmuseum.org/>

Evergreen Aviation Museum, McMinnville, OR - <http://www.sprucegoose.org/>

Fernbank Science Museum, Atlanta, GA - <http://fsc.fernbank.edu/>

March Field Museum, Riverside, CA - <http://www.marchfield.org>

Museum of Aviation Robins AFB, Macon, GA - <http://www.museumofaviation.org/>

National Museum of Naval Aviation, Pensacola, FL - <http://www.naval-air.org/>

Pima Air and Space Museum, Phoenix, AZ - <http://www.pimaair.org/index.html>

Museum of Flight, Seattle, WA - <http://www.museumofflight.org/>

Sun N Fun Air Museum, Lakeland, FL - <http://www.sun-n-fun.org/content/museum/main.asp?section=museum>

United States Air Force Museum, Dayton, OH - <http://www.wpafb.af.mil/museum/>

Virginia Air and Space Museums, Hampton, VA - <http://www.vasc.org/>

International Women's Air & Space Museum - <http://www.iwasm.org/>

# AIRCRAFT PICTURES

<http://aircraft.newspack.org/>

<http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/44-80/preface.htm>

<http://www.dunlopairstyres.com/gallery/index.htm>

<http://www.kilroywashere.org/005-Pages/AC-Rec/05-AC-Recog-01-.html>

<http://www.fas.org/man/dod-101/sys/ac/>

[http://147.71.210.21/vacr/gta/USAANDALLIED\\_files/frame.htm](http://147.71.210.21/vacr/gta/USAANDALLIED_files/frame.htm)

<http://us-aircraft.com/walk/walkarouds.htm>

<http://www.flyingzone.co.uk/knownyouraircraft/knownyouraircraft.htm>

<http://www.aerospaceweb.org/aircraft/jetliner/index.shtml>

<http://www.aerospaceweb.org/aircraft/commuter/index.shtml>

<http://www.aerospaceweb.org/aircraft/fighter/index.shtml>

<http://www.aerospaceweb.org/aircraft/bomber/index.shtml>

<http://www.aerospaceweb.org/aircraft/attack/index.shtml>

<http://www.aerospaceweb.org/aircraft/recon/index.shtml>

<http://www.aerospaceweb.org/aircraft/maritime/index.shtml>

<http://www.aerospaceweb.org/aircraft/transport-m/index.shtml>

<http://www.aerospaceweb.org/aircraft/helicopter-m/index.shtml>

<http://www.aerospaceweb.org/aircraft/research/index.shtml>

<http://home.planet.nl/~wees0131/>

<http://www.aviation.about.com/cs/unusualaircraft/>

<http://www.helis.com/prin1.htm>



# **Community Colleges offering Aviation and Aerospace Programs**

## **Aviation Maintenance Management Technology**

Broward Community College  
Miami-Dade Community College  
Palm Beach Community College

## **Aviation Operations or Administration**

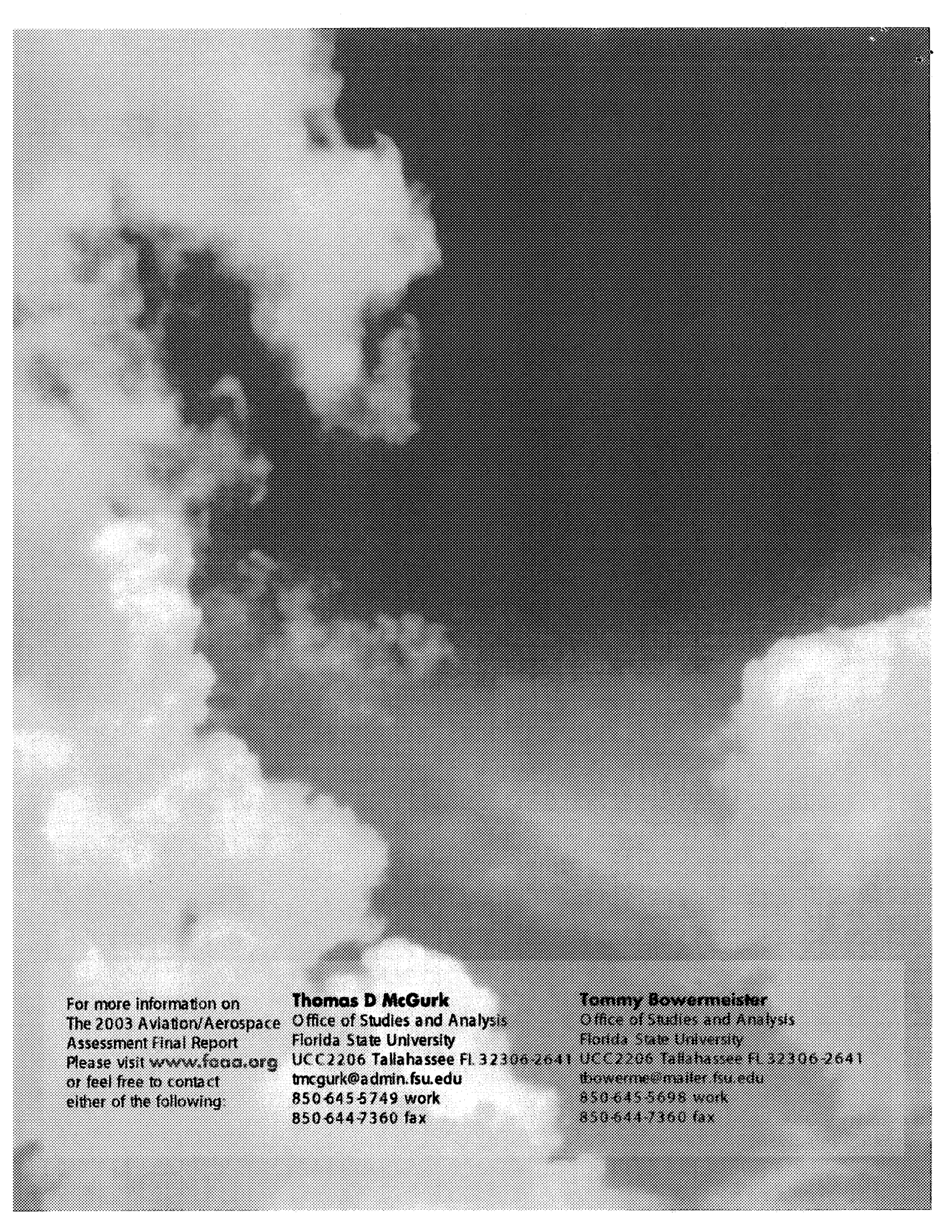
Broward Community College  
Florida Community College at Jacksonville  
Miami-Dade Community College  
Palm Beach Community College  
St. Petersburg College

## **Aerospace Technology**

Brevard Community College

## **Professional Pilot Technology**

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Central Florida Community College  
Florida Community College at Jacksonville  
Indian River Community College  
Miami-Dade Community College  
Palm Beach Community College



For more information on  
The 2003 Aviation/Aerospace  
Assessment Final Report  
Please visit [www.faaa.org](http://www.faaa.org)  
or feel free to contact  
either of the following:

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